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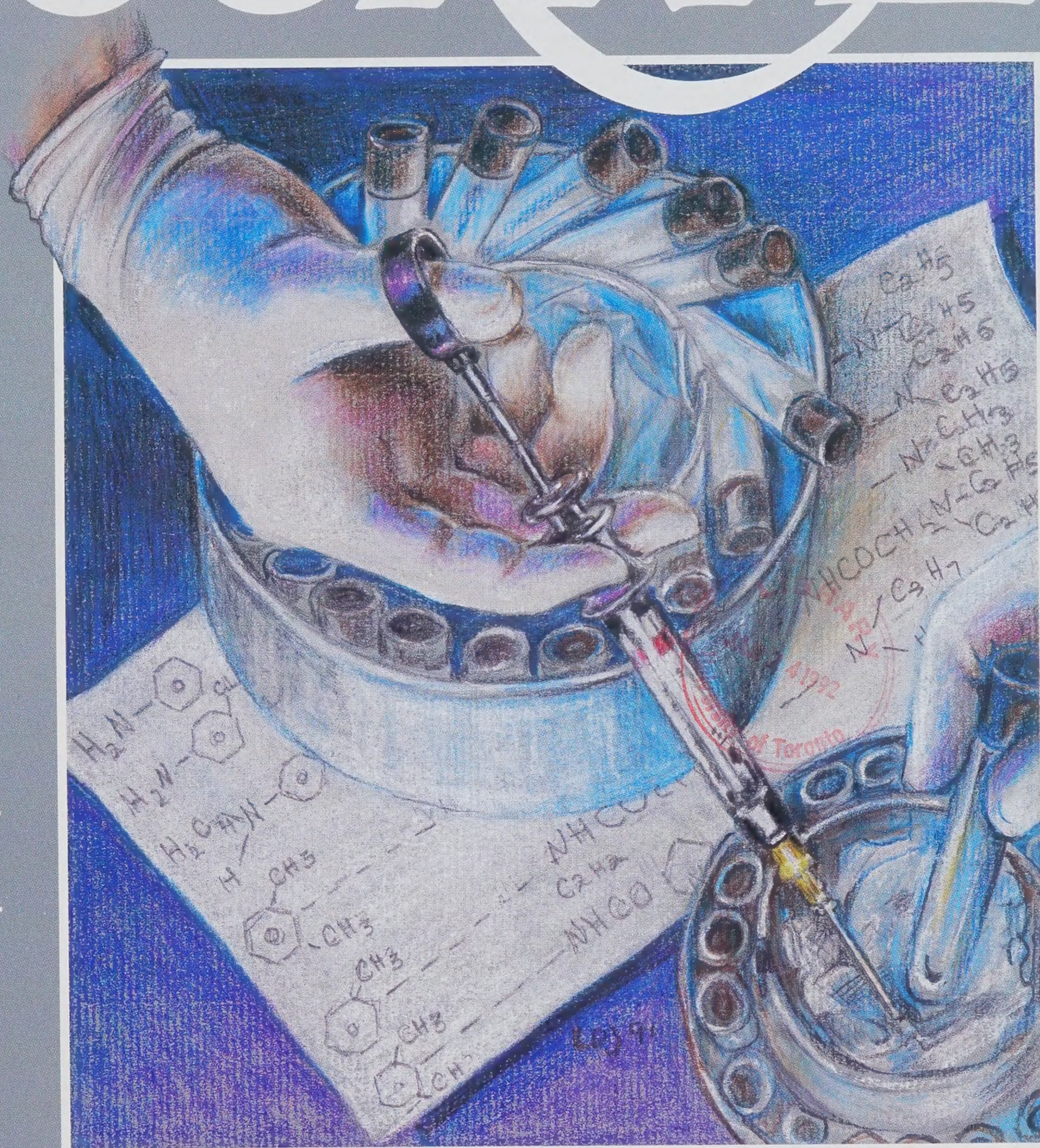
JOURNAL



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January 1992

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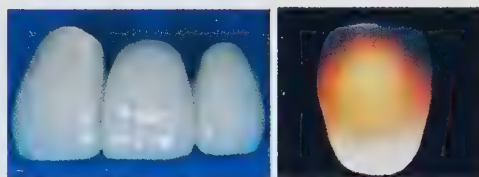
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Editorial

1992 – A YEAR OF CELEBRATION

Many of you, on reading the title of this month's editorial, probably asked, "What have we got to celebrate?" And it's a valid question. You don't have to read many newspaper headlines or watch hours of television news to conclude that 1992 may not be the best year of our lives. The prospects for a quick end to the recession are dim, Canada's constitutional crisis will probably reach the boiling point, and the country's deficit will continue to grow. On the world stage, it is unlikely that a cure will be found for AIDS, that prosperity will suddenly come to starving countries, or that oppressive nations will hear the call of freedom.

But 1992 is a year and a time for celebration. Historically, the year stands as a beacon, reminding Canadians of our rich cultural heritage, and the dental profession of its many wonderful achievements. For 1992 is a year of anniversaries – a year to remember what mankind has accomplished in the past, and a year to put the future in perspective.

Throughout North America, there will be numerous celebrations this year to mark the 500th anniversary of Christopher Columbus's voyage to the New World. But there will be controversy surrounding these events, too, as many groups now say that Columbus did not actually discover North America. (Given the Vikings' earlier expedition to Newfoundland, and the fact that Native peoples have lived on the continent for thousands of years, this view is probably technically, and certainly politically, correct.)

An event of more immediate importance for many of us will occur July 1, when Canada celebrates 125 years of Confederation. Yet even this milestone is shrouded in doubt and uncertainty. No one really knows what lies in store for our nation, if 1992 will be an incredible year of celebration or a year of division. So, if you haven't come up with a New Year's resolution yet, make one right now for the country. Canada will need all the help it can get in the next 12 months – and beyond.

On a lighter note, 1992 is a leap year. All of us will have an extra day this February to reflect on our New Year's resolutions, while those of us who were born on February 29 can finally make up for the lost birthdays of the previous three years.

And 1992 also has great meaning for the medical and dental communities, as it marks the anniversaries of a number of significant turning points in the health-care field...

In 1842, 150 years ago, Dr. Crawford Long became the first physician in the world to use sulphuric ether gas as an anesthetic agent prior to a surgical operation. Thanks to his work, conducted in a small town in Georgia, mankind entered a long dreamed of era – surgery without pain.

In 1992, the Ontario Dental Association (ODA) will celebrate its 125th anniversary. Founded on July 2, 1867, ODA was Canada's first dental organization. One year later, on September 8, 1868, 15 Quebec dentists drafted the first



Dr. Ralph Crawford

constitution and bylaws for the Dental Association of the Province of Quebec.

In the fall of 1892, 100 years ago, the first dental school was established in Quebec. Dr. W. George Beers, one of the most outstanding dentists in Canadian history, was appointed dean, and classes were held in a leased building located at Phillips Square in Montreal. Instruction was given in both French and English, with students taking medical subjects at either McGill or Laval universities.

In 1992, Alberta's dental faculty will celebrate the province's 75th year of dental education. The first dental program offered

by the University of Alberta was organized in 1917, with candidates taking the initial two years of the four-year program through the school's faculty of medicine and their last two at either the University of Toronto or McGill University.

The Canadian Dental Association will also be celebrating this year, as we recall the first 90 years of our history. CDA was founded at a meeting in Montreal in 1902, when 344 dentists from across Canada adopted both a "national voice" and the Dominion Dental Council.

And silver anniversary congratulations are extended this year to the Association of Canadian Faculties of Dentistry. After many years of affiliation with the American Association of Dental Schools, Canadian dental educators formed their own association in 1967.

Finally, albeit belatedly, we recognize the 100th anniversaries of organized dentistry in Canada's three Maritime provinces. In 1890, New Brunswick became the first Eastern Canadian province to proclaim a Dental Act, and the following year both Nova Scotia and Prince Edward Island passed dental association statutes.

So we do have something to celebrate in 1992, even with the tough times that seem to lie ahead. To emphasize this, throughout 1992 the *Journal* will dedicate a page per month to "A Year of Celebration." Hopefully, the excerpts from dental history that appear on these pages will stir an appreciation for the richness of the professional life we, as dentists, have enjoyed over the years.

As George E. Wilson said in a presidential address to the Canadian Historical Association in 1951: "For me there is no greater subject than history. How a man can study it and not be forced to become a philosopher, I cannot tell. Questions the most profound and the most searching are forever being asked. History is poetry and art. It deals with the greatest story known to man – the whole story of his existence from the beginning of time down to the present. History is knowledge."

P. Ralph Crawford, BA, DMD

Editor: *Journal of the Canadian Dental Association*

“CDA is my source
of national
information.”

*Dr. Pam Zakarow
Oshawa, Ontario*

*Dr. Pam Zakarow:
General practitioner,
equestrian — and
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President's Column

FROM BEHIND THE CRYSTAL BALL

In 1991, the CDA Board of Governors made communication the number-one priority for CDA. Throughout the year, we put extra emphasis on our communications with members, dental consumers, governments, the media, and the general public. We responded effectively to public concerns over HIV and dental amalgam, and succeeded in securing a number of extremely important changes to the Goods and Services Tax.

Not surprisingly, given the realities of today's fast-paced world, to say nothing of the success we enjoyed last year, communication will remain CDA's top priority in 1992. But in many ways, the road we have followed in the '90s was built in fall of 1984, when the decision was made to begin the Dental Awareness Program (DAP).

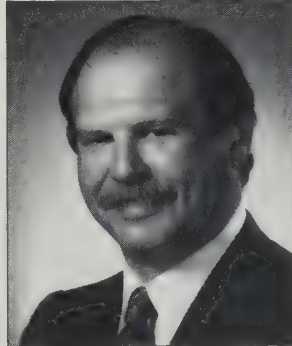
Through DAP, which recognized how important it was for the association to communicate with the public in a more meaningful way, CDA's executive and board of governors laid the groundwork for a unique "two-lane" communication strategy. The first "lane" would make it possible for members to use the association as a resource and source of expertise, while the second "lane" would open up the area of public education.

At first glance, the dollars allocated to the dental awareness program were significant. DAP was new, very exciting, and very costly. (An effective national public awareness program is inherently expensive due to its magnitude and scope.) But the results achieved by DAP have been outstanding and the rewards great – the awakening of a sleeping giant.

From the beginning, our consultants said we would receive a four-fold return on our investment. They were not referring to dollars *per se*, but to the increased public support, radio and television air time, positioning, etc., that would be generated by DAP. This was achieved, with great success, in several important areas.

Key projects included four dental health magazine supplements – in *MacLeans*, *Canadian Living*, *Coup de Pouce* and *Chatelaine*. These supplements were supported by a variety of companies initially, but Colgate has been the exclusive sponsor in recent years.

Our First Teeth Program, aimed at parents of children from two to nine years of age and sponsored by Colgate, has also been an outstanding success. And late last year, we developed and began marketing our new dental information system (DIS), which features



Dr. Les Allen

eight educational booklets on a variety of subjects. We expect this initiative – also sponsored by Colgate – to be extremely beneficial to both dentists and the public.

Other CDA initiatives include a joint public awareness television campaign with Colgate, patient communication seminars (sponsored by various provincial organizations such as the Ontario and Manitoba dental associations), a dental health promotion at the Calgary Stampede (sponsored by Proctor and Gamble), and the Dental Pentathlon (sponsored by Bausch and Lomb).

CDA's dental awareness program has reached beyond the association itself. The sleeping giant I mentioned earlier had 10 partners. Shortly after CDA launched DAP, we heard from all of them. And these partners – the 10 provincial dental associations – have worked hand in hand with us to increase the dental awareness and education of Canadians in all parts of the country. From the large dental awareness programs initiated by the Quebec, Ontario and B.C. associations to the more singularly focused programs started in the smaller provinces, the results have been very rewarding.

Before launching DAP in 1985, CDA initiated a dental Gallup poll to determine where dentistry stood with the Canadian public and how much they knew about oral health care. This survey was followed up with an additional Gallup poll in 1988, and then through a Canadian Health Monitor poll in 1991.

Through these surveys, we were able to judge the success of our various DAP programs. We found out what Canadians really knew about oral health care, how they perceived the dental profession and what they wanted from their dentists. Most important, we found out that we were doing a good job on behalf of the profession and the public.

And so, as we begin a new year, we again will stress to our members how important communication is to the Canadian Dental Association, to you, our members, and to the public. Whether it is from us to you, from you to your patients, or from your patients to you, communication is the key to the future of our profession.

So don't forget to talk to CDA about your concerns or aspirations. Tell us what you feel. We're here for you.

Les Allen, B. Comm., DMD
President of the Canadian Dental Association

A LEGEND

One night, in ancient times, three horsemen were riding across a desert. As they crossed the dry bed of a river, out of the darkness a voice called, "Halt!" and they obeyed. The voice then told them to dismount, pick up a handful of pebbles, put the pebbles in their pockets and remount. The voice then said, "You have done as I commanded. Tomorrow at sun-up you will be both glad and sorry." Mystified, the horsemen rode on. When the sun rose they reached into their pockets and found

that a miracle had happened. The pebbles had been transformed into diamonds, rubies and other precious stones.

They remembered the warning and they were indeed both glad and sorry. Glad they had taken some, sorry they had not taken more. And this is the story of insurance.

Author unknown

The need for insurance is no legend.

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News Update

Dr. Geraldine Morrow New President of the American Dental Association



Dr. Geraldine T. Morrow

Dr. Geraldine T. Morrow, of Anchorage, Alaska, was installed as ADA's 128th president at the association's annual meeting in Seattle last October. She is the first woman to hold ADA's highest office.

Dr. Morrow graduated *magna cum laude* from Tufts University School of Dental Medicine in 1956 before moving to Alaska to begin her professional career as an intern with the Indian Health Service. Her distinguished career in Alaska has included practising general dentistry, providing innovative and influential leadership in dental education, and holding major offices in organized dentistry at the local, state and national levels.

ADA has 140,000 members.

Canadian Academy of Oral Medicine — Recreated

After a hiatus that lasted for more than 15 years, the Canadian Academy of Oral Medicine has been formerly recreated. The group, which now has 39 members, recently ratified a new constitution and bylaws. Its mandate is to promote education, research and clinical practice in the discipline of oral medicine. Similar academies exist in the United Kingdom and the United States.

Elected officers of the academy are: president, Dr. Ralph Brooke, London, Ontario; vice-president, Dr. Joel Epstein, Vancouver, B.C.; secretary, Dr. Bruce

Blasberg, Vancouver, B.C.; treasurer, Dr. Monique Michaud, Montreal, Quebec.

Dr. Dennis Nimchuk Elected President of Canadian Academy of Prosthodontics



Dr. Dennis Nimchuk

Dr. Dennis Nimchuk, a Vancouver prosthodontist, was elected president of the Canadian Academy of Prosthodontics during the group's annual meeting in Toronto, Ontario, last September.

Other elected officers are: president-elect, Dr. George K. Scott, Hamilton, Ontario; vice-president, Dr. Kira Obrazcova, Ottawa, Ontario; secretary-treasurer, Dr. Graham R. Matheson, Vancouver, B.C.; senior past-president, Dr. David H. Charles, London, Ontario; junior past-president, Dr. Carl J. Osadetz, Edmonton, Alberta.

The next annual meeting and scientific session of the academy will be held jointly with the Canadian Academy of Restorative Dentistry at Le Grand Hotel, Montreal, Quebec, September 24-26, 1992.

Canadian Society of Public Health Dentists Elects New Executive

The Canadian Society of Public Health Dentists elected a new executive during a meeting held in Quebec City last August. Dr. Neil A. Farrell of London, Ontario, is now the president of the organization. Other members on the ex-



Dr. Neil A. Farrell, president, Canadian Society of Public Health Dentists

ecutive are: president-elect, Dr. Peter Cooney of Winnipeg, Manitoba; past-president, Dr. Benoit LaFontaine, Quebec City, Quebec; secretary-treasurer, Dr. Marcel Tenenbaum, Verdun, Quebec.

Dr. Farrell received his dental degree from the University of Toronto in 1968, and practised in Ottawa from 1968 to 1975. He then returned to the University of Toronto, receiving his diploma in dental public health in 1976. Since that time he has been dental director at the Middlesex London Health Unit in London, Ontario. He currently serves as a member on CDA's committee on community and institutional dentistry, as well as on the dental specialties committee.

Full-Time Dentists — Part-Time Soldiers

Last August, two Calgary dentists, periodontist Dr. William H. Fallon and prosthodontist, Dr. Gregory N. Mohr, forsook the comfort of their civilian practices to don army uniforms and provide dental services to 2,700 militia soldiers.

Dr. Fallon, a major in the Canadian Militia (army reserve), and Dr. Mohr, a captain, are members of the Prairie Militia Area Dental Section, the only dental section in Canada that deploys with operational troops in the field. Both men were participating in Exercise MILCON 91, held at Canadian Forces Base Wainwright in Alberta.

Commanded by Major Fallon, the four-man dental team lived in a tent at

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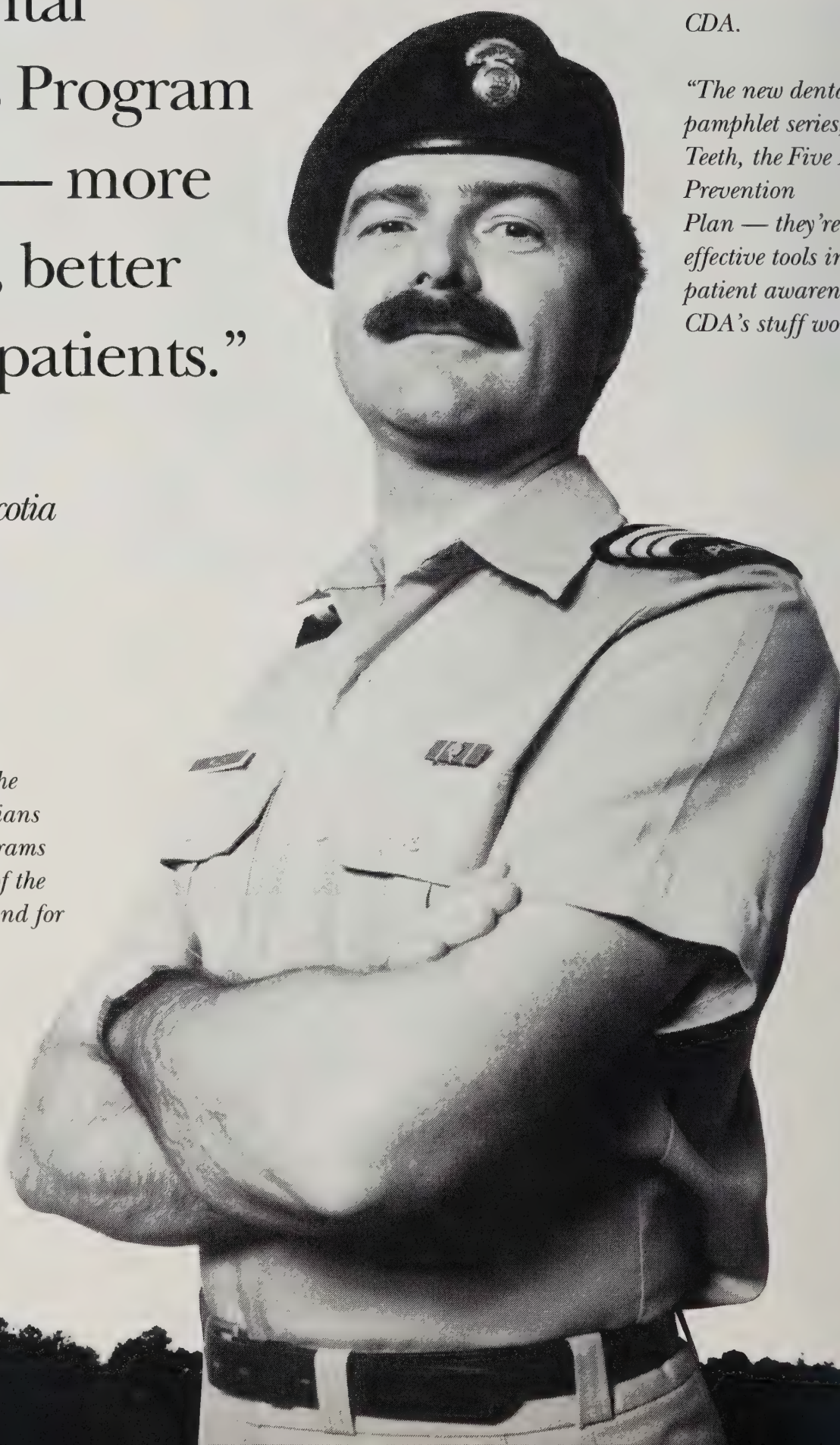
Dr. John Miller
Dartmouth, Nova Scotia



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effective tools in
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The Prairie Militia Area Dental Section, CFB Wainwright: (l to r) Lieutenant Dean Gresko, Corporal Joseph Dumont, Captain Gregory Mohr, Major William Fallon.

the edge of a small wood for the duration of the 10-day exercise, but the heart of their operation was a two-and-a-half ton truck containing an air-conditioned, fully-equipped dental office. In fact, Major Fallon's mobile dental section can do virtually anything that can be done in a private practice office. A laboratory van, although not deployed in the Wainwright operation, allows the unit to complete inlays, crowns and bridges.

In addition to normal dental equipment, the section's dental van has a number of special features related to its military role. For example, the pod containing the office can be lifted from the back of the truck and placed on the ground, releasing the vehicle for other duties. Power is supplied to the pod from a 10-kilowatt diesel generator mounted on a separate trailer. When tactical conditions make the running of a noisy generator inadvisable, battery power is available to run all the equipment.

In the field, where it is often in use 24 hours a day, the pod's windows can be sealed so that no light escapes to give away its location. A special interlock device turns off the lights whenever the door is opened.

Dental Officers Graduate At CFB Borden

Impressive graduation ceremonies were held at Canadian Forces Base Borden last August for students in the Dental Officer Training Plan (DOTP).

Reviewing officer Brigadier-General J.F. Begin, the forces' director general of dental services, presented certificates to

21 graduates representing each of Canada's 10 faculties of dentistry.

DOTP is a Canadian Forces program that subsidizes the educational and liv-



Top: Brigadier-General J.F. Begin (left) presents the Honor Candidate trophy to Second Lieutenant J.P. Picard of Laval University and; Bottom: the Field Exercise trophy to Second Lieutenant M.G.N. Dubois, also of Laval University.

ing expenses of dental students. In their third or fourth year of dental school, these students become familiar with the administrative and management procedures of Canadian Forces Dental Services, and are exposed to "field environments" or mobile field dental clinics. Graduates are posted to Canadian Forces Dental Clinics for three or four years of obligatory service.

Ottawa Dental Society Sponsors Free Mouth Guard Clinic

The Ottawa Dental Society sponsored a free mouth guard clinic for Ottawa area high school football players September 14 last year. A total of 165 mouth guards – each with a market value of \$100 – were custom fabricated and fitted during the event.

The community exercise, held at the Algonquin College Dental Clinic, was a cooperative effort of the Ottawa Dental Society, the Ottawa Dental Hygienists Society, and the Ottawa Dental Nurses and Assistants Association. Algonquin College auxiliary students and staff provided the labor, while Ash Temple Limited and Healthco (Canada) generously donated the required dental supplies.

Participating Ottawa laboratories included Allan & Rollaston, Spectrum Dental Lab and Precision Technics. Dr. Arthur Wood, the Mississauga pedodontist who recently received the Order of Canada for his life-long contribution to safety in sports, was also present to offer assistance and advice.



The master at work: Dr. Arthur Wood, recently awarded the Order of Canada for his contributions to sports safety, is observed by Ottawa dentists, Drs. Brent Johnson and John Kershman.



The laboratory at Algonquin College Dental Clinic, Ottawa, Ontario, with the whole team in action, fabricated 165 mouth guards in a single day.

Phoney Contest Targets Dentists

A Quebec-based company is believed to be operating a fraudulent contest that has the potential to cost dental practitioners across Canada thousands of dollars.

Under the scam, telephone solicitors are used to contact individual dentists. The callers tell each dentist that he or she has won an expensive prize in the current Dentists Across Canada draw. But there's a catch. To claim his or her windfall, the lucky winner must complete an order for the company's products, which include items such as tooth-shaped magnetic business cards, pencils, and pens.

The callers then suggest that the "winning" dentist order these products over the phone, using his or her credit card number. That way, say the callers, the whole process will be speeded up, and the dentist will receive his or her prize, which is claimed to have a minimum value of \$8,000, much sooner.

But as Det. Sgt. Barry Elliott, a member of the Ontario Provincial Police Commercial Crime Unit, explains, dentists who have divulged their credit card number to the company's callers have had unauthorized charges billed to their cards for up to a year.

Det. Sgt. Elliott, who is investigating the scam, has advised dentists not to give out their credit card numbers over the phone. Individuals who have already been victimized can contact the sergeant at: 320 Airport Road, Box 686, North Bay, Ontario P1B 8W9; telephone 705-495-3899; fax 705-494-4008.

Kimberly Bergalis -A Tragedy

Kimberly Bergalis's battle against AIDS is over.

Ms. Bergalis, the first person ever reported to have been infected with the HIV virus by a health-care provider, died at her home in Fort Lauderdale, Fla. December 8. She was 23.

Her death, following months of suffering brought about by AIDS, was a tragedy in every sense of the word. It also remains a mystery.

In July 1990, the Centers for Disease Control in Atlanta reported that Ms. Bergalis was believed to have contracted the HIV virus from her dentist, Dr. David Acer. But to this day, despite an exhaustive medical investigation, no one is sure how the virus was transferred from Dr. Acer to Ms. Bergalis. Dr. Acer, who died in 1990 of an AIDS-related illness, may have carried the secret to his grave. He was 40.

Since January 24, 1990, when Ms. Bergalis first learned she had AIDS, there have been a multitude of questions raised on the rights and obligations of HIV-infected health-care providers and patients. Contentions have been made, positions taken, and new issues brought to light, but little, if any, conclusive action has been taken as a result - despite Ms. Bergalis's call for the mandatory testing of health-care providers, along with full disclosure.

Yes, numerous conferences and symposia have been held to debate

DID YOU KNOW?

A gossip talks about others,
a bore talks about himself
and a brilliant
conversationalist talks about you.



AIDS in relation to ethics, disclosure and mandatory testing. And, yes, the U.S. Senate voted in favor of a law that would impose prison sentences on any health-care provider who failed to disclose his or her seropositive status to patients, but, again, no conclusive action has been taken.

We must not stop here, however. We can't hide from the AIDS issue, and we can't fail in our efforts to ensure that Kimberly Bergalis's tragic end was not in vain.

Few events have brought as much attention to the dental profession as the plight of Ms. Bergalis. Dentists everywhere mourn her untimely death, and sympathize with the loved ones she left behind.

No amount of unsubstantiated condolences will make up for the early loss of Kimberly Bergalis or that of Dr. David Acer, however. Or for the loss of the countless others that have succumbed to AIDS, a dreaded disease with no known cure. Or for the suffering that has been endured by the friends and families of AIDS victims.

We must work together to bring an end to this suffering. We call on all science, all dentistry and all mankind to do what is humane and right. Let's put a stop to AIDS, and an end to this ongoing tragedy.

P. Ralph Crawford, Editor

CDA Participates in Health and Welfare Canada's "Break-Free" Campaign



CDA, which adopted its first no-smoking policy in 1964, has joined forces with Health and Welfare Canada to distribute an anti-smoking message to Canadian dental offices.

Health and Welfare Canada's "Break Free" poster, aimed at Canadians between 10 and 17 years of age, was sent to every Canadian dentist with the January issue of the *Journal*. The poster is just one part of the government's public information program to persuade Canada's youth to adopt a non-smoking lifestyle.

Launched in 1985, the "Break-Free/Fumer, c'est fini!" program is intended to "unite governments at all levels, national health organizations and community groups to work effectively on eradicating the single most preventable cause of death and illness in Canada today - tobacco..." said Lina Calamo, the senior marketing and communications officer for the Health Promotion Directorate.

"It strives to persuade young people to adopt a non-smoking lifestyle and maintain this lifestyle as they become adults."

More than 38,000 Canadians die each year from illnesses caused by smoking.

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A Year of Celebration

500 Years of Discovery



1492 – Christopher Columbus

Nearly all of us, at some point in our lives, have repeated the refrain, "In fourteen hundred and ninety two, Columbus sailed the ocean blue."

And, more recently, you've probably read a newspaper article or seen a television program about the controversy that seems sure to erupt later this year when North Americans celebrate the 500th anniversary of Christopher Columbus's "discovery" of the New World.

A paragraph that appeared in *USA Today* last October sums up the mixed feelings toward Columbus rather well: "For native Americans, he (Columbus) wasn't the great discoverer, he was the great invader. For African-Americans, he wasn't the first immigrant, he was the first slave owner. And for environmentalists, he wasn't the great explorer, he was the great destroyer."

But Columbus remains a mysterious figure. To this day, historians are not sure when he was born, where he first landed, where he is buried or what he actually looked like. In fact, it is said that there are at least two dozen pictures of the man and no two are the same.

However, if current history is correct, Columbus set sail in three tiny ships – with nothing but crude navigation equipment to guide him – in search of a better route to the trade centres of the Far East. He was the first known explorer to conceive of reaching these lands by circumnavigating the earth – he sailed west, remember – and possibly

the first European to land in the New World. Furthermore, he overcame significant hardships during the voyage.

When Columbus is viewed in the context of the society he lived in, his achievement seems more worthy of celebration.

1842 – Dr. Crawford W. Long

Although Dr. Horace Wells of Hartford, Connecticut, has been given credit for the first use of anesthetic (nitrous oxide) in a dental operation – performed on his own tooth – the first known instance of "surgery without pain" took place on March 30, 1842. On that date, Dr. Crawford W. Long, a physician from Jefferson, Georgia, administered sulphuric ether to Mr. J.M. Venable during an operation to remove a small glandular tumor from Mr. Venable's neck. History records the event with Mr. Venable's testimony, "I did not experience the slightest degree of pain."

A statue of Dr. Long in Washington, D.C.'s, Statuary Hall bears an inscription describing the dedication he had for his work, "My profession is to me a ministry from God."



1867 – Dr. Barnabus W. Day

Dr. Barnabus Day was born on a farm near Kingston, Ontario, in the 1800s. As a young man, he articulated with a dentist, P.J. Sutton of Kingsbury, Quebec, prior to practising dentistry in the Kingston area in the late 1850s. He attended medical school at Queen's University, graduating in 1862, and continued to practise dentistry.

In the fall of 1866, Dr. Day circulated a letter to the dentists of Ontario calling for a meeting in Toronto. It is not known how many dentists practised in Ontario at the time, but nine concerned individuals responded to Dr. Day's call and gathered at Toronto's Queen Hotel on January 3, 1867.

No minutes of the meeting survived, but it is known that Dr. Day was elected chairman and that the stated purpose of the meeting was to find ways and means of securing legislation for dentistry.

Six months later, on July 2, 1867, at a meeting in Cobourg, Ontario, 31 dentists adopted a report on a constitution and bylaws for a new organization. This marked the founding of the Ontario Dental Association, the first official organization of dentists in Canada.

1890 – New Brunswick

Dr. Don Gullett wrote in his *A History of Dentistry in Canada*, "History does not produce men; it is men who make history," and such was the case in New Brunswick, which in 1890 became the first of Canada's three Maritime provinces to proclaim a Dental Act.

After a number of failed attempts at association, Dr. C.A. Murray of Moncton called a meeting of dentists in December 1889. They met in the office of Dr. James M. Magee of Saint John and adopted the resolution, "It is desirable in the interests of the profession and the public generally, that a society of dentists of the Province of New Brunswick be formed, and a bill regulating the practice of dentistry in the Province of New Brunswick be drafted and presented to the legislature at its next session."

Forty dentists were registered in New Brunswick in 1890, the first year of the new Dental Act. The registration fee was set at not less than \$1 and no more than \$5.

("A Year of Celebration" will be a continuing feature in the Journal throughout 1992. The Editor invites comments from the readers. References used in this month's material are A History of Dentistry in Canada, D.W. Gullett; Anesthesia in Dental Surgery, Sterling Mead, and the historical notes of Dr. Oskar Sykora, Dalhousie University.)

Letters

■ Ortho Treatment and X-Rays

The clinical feature "Orthodontic treatment for the adult periodontal patient," which appeared in the October 1991 *Journal*, contains some statements which invite critical comment.

The multidisciplinary approach for patients with complicated treatment needs is most commendable and may achieve, where indications are carefully determined, remarkable results.

However, in my opinion, the author's case selection was unfortunate. In Fig. 1b, which is a radiograph early in treatment, he describes "early crestal bone loss on molar." Such an interpretation cannot be made from the image shown. Rarefaction has extended beyond the apex of the mesiobuccal root of the first molar and more than half-way to the apex of the palatal root. The radiolucency between the buccal roots is consistent with exposure of the trifurcation. The attachment loss on the conical root of the second molar is more than 50 per cent. In the legend for Fig. 1d, the reason for the subsequent loss of the first molar is given as "poor inflammatory and occlusal control." I would suggest a more likely explanation is the initial severe lack of supporting bone, clearly evident in the early radiograph. While it is difficult to judge the extent of periodontitis from two radiographs, with no examination date, the inference for the teeth shown surely must be a very limited to poor prognosis.

Where treatment involves orthodontics, oral and/or periodontal surgery and extensive prosthesis, it is essential that extreme care in patient selection be observed. As a supplement to the author's comment on the dentists' obligation, I would refer all of us to the CDA Dental Patients' Charter of Rights, especially item 2, which appeared by happy chance at the end of Dr. Levitt's article.

Before extensive and expensive therapy is proposed the patient must have a clear understanding of the prospects of success in terms of years of useful service and the cost in money, time and pain over the very long course of treatment.

In the context of these comments, I have a measure of disquiet if the following quote represents the author's view of the patient's obligation, "...a total financial commitment on the part of the patient is absolutely essential." I have to believe that most in the profession, including Dr. Levitt, have a more generous view of the patients' role in treatment.

Russell G. Stephens, DDS, M.Sc.
London, Ontario.

■ Dr. Levitt's Response

I wish to reply to the comments made by Dr. Russell Stephens relative to my article, "Orthodontic treatment for the adult periodontal patient."

Firstly, I must emphasize that the two photographs and the two radiographs which appeared with the text were included specifically to show the periodontal breakdown that may occur with poor inflammatory and occlusal control during orthodontic treatment, and *not* to illustrate the multidisciplinary approach to treatment. Fully documented case reports with pre- and post-operative results illustrating proper orthodontic treatment for adults have been submitted to the *Journal* for consideration for publication. The *extreme* example included with the text is that of a 45-year-old female who was the most severe clencher imaginable, and whose periodontal maintenance

(Continued on page 63)

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CDSPI Reports

Dr. Gilles Dubé joins CDSPI Management Committee

Dr. Gilles Dubé, a past president of the Canadian Dental Association, became the member designate of the Canadian Dental Service Plans Inc. (CDSPI) management committee January 1. He will serve as the fourth member of the committee, alongside its current members: Dr. Melvin D. Charendoff, president; Dr. Rod L. Moran, treasurer; and Dr. James Wright, secretary.

Dr. Dubé's year-long term as member designate will prepare him to become a fully participating member of the CDSPI management committee on January 1, 1993. He is the second dentist to be appointed to the committee since 1988, when the CDSPI Board of Directors decided to limit the maximum term in office for committee members to seven years.

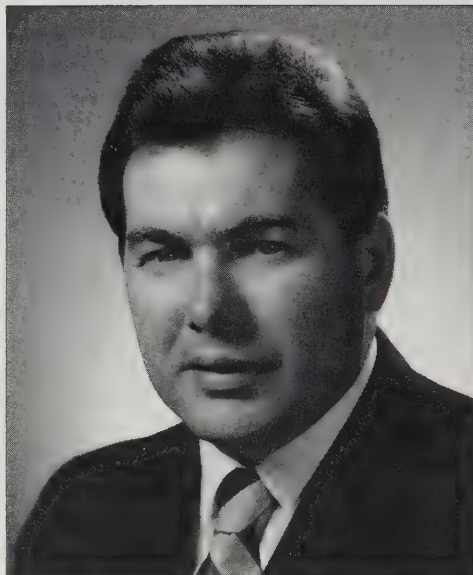
The CDSPI management committee, which is elected annually by the board, controls and supervises the day-to-day operations of CDSPI. Its major responsibilities involve the areas of finance, review, negotiations, planning, professional interface, reporting and organizing.

In this regard, the committee meets regularly with CDSPI's executive vice-president. It also meets, as required, with insurers and professional consultants, who have expertise outside the immediate capabilities of CDSPI staff, to provide the highest quality of service to the dental profession.

Members of the management committee must devote considerable time and effort to the body – to provide leadership, to be attuned to the needs of the profession and to be knowledgeable about corporate management, insurance, retirement savings plans, and other aspects of CDSPI.

Dr. Dubé was chosen to serve on the management committee because of his extensive record of service to Canada's dental profession and his proven leadership abilities.

In 1974, Dr. Dubé represented the University of Montreal at CDA's Students' Conference in Halifax. He received his dental degree in 1977, and entered private practice in Laval, Quebec, where he remained for more than nine years. Dr. Dubé then moved to



Dr. Gilles Dubé, CDA past president

Lachute, Quebec, where he maintains an active practice today.

Dr. Dubé served as president of the Laurentides Dental Society in 1980-1981, and represented the region on the Quebec Dental Association board in 1980. He moved up to the QDSA's executive in 1982, and in 1986 he was elected as a QDSA representative to the CDA Board of Governors as well as a member of the CDA executive council. During that time, he chaired CDA's membership committee and represented the association on the CDSPI Board of Directors. In addition, Dr. Dubé completed a master's program in health administration at the University of Montreal, earning his degree in 1989.

Recently, Dr. Dubé was asked several questions regarding his future involvement with CDSPI and his role on its management committee.

CDSPI: Dr. Dubé, on behalf of all CDSPI participants and employees, we welcome you as a new member of the CDSPI management committee. Would you tell us what attracted you to this position?

Dr. Dubé: CDSPI is known to be a successful organization which has an enviable record of service to the dental profession. After my year as president

of the Canadian Dental Association, I was looking for another challenge. The position on CDSPI's management committee was one of my options. As a former director on CDSPI's board, I knew the quality of the individuals involved, and I was looking forward to becoming a member of such a successful team.

CDSPI: What do you see as the future role of CDSPI?

Dr. Dubé: I believe that CDSPI must continue to offer the best programs possible to meet the needs of Canada's dentists in the areas of insurance, retirement savings and other related activities. However, in order to continue this excellent work, we will have to offer our participants better products and services in the most cost-effective way possible.

CDSPI: Other than your proven record of service to the dental profession, what can you bring to CDSPI that will enhance its services?

Dr. Dubé: First of all, CDSPI will bring a lot to me. I will learn a great deal, especially in my first year but also in the years to come. Personally, I will bring the same skills that I have offered to other organizations. Among these, I think it is fair to list sincerity, honesty, dedication to our profession and its participants, creativity, and management skills. My only goal since I became involved in organized dentistry has been the betterment of our profession. I will still have the same goal, but it will now focus on one aspect – developing and offering programs that will meet the needs of all participants.

Dr. Dubé spends what little free time he has with his wife and two daughters. He enjoys golf, tennis, cross-country and downhill skiing.





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Library/Bibliothèque

CDA's Sydney Wood Bradley Memorial Library is recognized across Canada – in dental offices, universities and hundreds of health organizations – for its fast and efficient service.

Each day, library staff provide information to both CDA members and the general public in response to a wide range of questions and concerns. For example, callers might ask: "I have to present a case for fluoridating the water in my community. I need documents to support my case"; or...

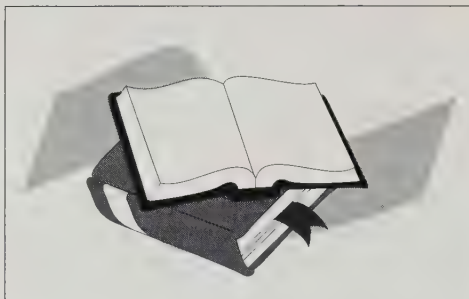
"My patients are asking me about the safety of dental amalgams. Can you send me some recent studies?";

"I want to keep my staff up to date on emergency management in the dental office. Do you have a video on this subject?";

"One of the hygienists in my practice is pregnant. Do you have any information on the precautions we should take to ensure her safety?"

In most cases, the answer to the many queries received by the library is "yes." We can provide studies, reports, videos, bibliographies, research results, books and much more on a wide variety of topics, and we can get this material out to members quickly, at a very minimal cost. We've got the information you need to make sound practice decisions, and to respond to concerns expressed by your patients.

In 1990-91, as part of a comprehensive automation project that is scheduled for completion by the end of 1992, the library's holdings were completely upgraded and computerized. This has



allowed staff to respond to requests for information more quickly than was possible in the past. In addition, because we communicate on a regular basis with the large network of libraries in North America, we can locate "hard-to-find" documents and have them forwarded to your office for just a few dollars.

One of the library's mandates is to keep you informed about the "hot" issues. To do this, we locate and package a series of relevant articles each month. Known as "Package Libraries," these articles are available on a wide range of topics – from office automation to dental implants to HIV.

This month's package contains over 25 current articles on the scientific and clinical issues surrounding fluorides. It is available for \$5 to CDA members and \$10 to non-members, and includes titles such as: "Fluorides and the prevention of dental caries"; "Fluoride products – an update for the '90s"; and "Feasibility of the combined use of fluorides."

Another service we offer to keep you informed – and save you money – is known as the "Table of Contents" program. Subscribers receive the monthly

contents pages from over 60 dental journals. If they see an article they want to read, the library sends it to them, again, at a minimal cost.

These are just some of the services available to you at the CDA Library. Think of us the next time you wish you knew more.



Paula Hollohan, a library cataloguer, has been a key player in the library's automation project.

New Acquisitions

Books

1. Shige, Eda. *Laboratory manual for general and oral pathology*. Tokyo, Chicago : Quintessence, 1990.
2. Sterling, Victor. *Fill in the gaps: a practical guide to healthy teeth*. Don Mills, Ont. : Addison-Wesley, 1991.
3. Carrière, José. *Inverse anchorage technique in fixed orthodontic treatment*. Chicago : Quintessence, 1991.

Videos – VHS

1. *Geristore: a pediatric/geriatric adhesive restorative* presented by Ronald Jordan. American Society for Clinical Research, 25 min.
2. *A simplified approach to placement of multiple cerinate laminate and a 360 cerinate crown* presented by Robert Ibsen. American Society for Clinical Research, 25 min.



The library subscribes to a wide range of dental and medical journals.

Practice Management & Success

Strategic Alliances: A Small Investment with Huge Dividends

The New Year has arrived. If you're like most people, you've already broken some – if not all – of the resolutions you swore you'd keep. So I'll refrain from burdening you with another made-to-be-broken resolution. What I will do, though, is challenge you to make an important commitment to yourself. It's a commitment that will assist you in practising dentistry not only this year and through the rest of the '90s, but also in the year 2000 – which is looming just around the corner – and beyond.

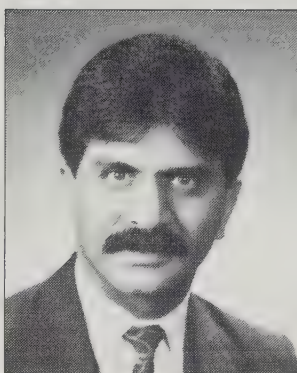
I'm asking you to commit to what I call strategic alliances, an umbrella term that covers networking, support groups and trouble-shooting. Though there are some forward-looking dentists who have already allied themselves with one another, and recognize the mutual benefits of doing so, there are many more who have not. My suggestion to this overwhelming majority is: jump on the bandwagon.

Strategic alliances – groups of six or seven dentists who join forces to help each other face practice problems – will be more vital than ever in the years ahead. We are facing unprecedented challenges in dentistry, from integrating and adapting to the latest technology to maintaining our patient flow. Yet dentists often isolate themselves from their colleagues, giving in to a fear of the competition. Rather than confronting the issues together, they struggle to solve the dentistry puzzle all alone.

If you've read this far, I'll assume that you're willing to consider a strategic alliance commitment, and that you want to know how to get started. Some words of comfort: getting the networking ball rolling doesn't have to be a hassle. However, it is important to remember that you shouldn't form alliances with dentists in your area. These people are your competitors. And the only thing you'll get from a room full of competitors is a deafening silence.

Finding Your Soul-Mates

The trick is to find the right group, one that will help you to identify not



*Imtiaz Manji
B.Sc.
President of
ExperDent
Consultants
Inc.*

only what you can do but what you could do. The group should share a common vision, interests and goals, and its members should openly communicate their ideas to one another at monthly meetings. Whether these meetings are spent discussing practice management issues or listening to a respected speaker on cosmetic dentistry, they'll prove invaluable in their ability to motivate, invigorate, and stimulate.

Your supplier's representative, through his or her exposure and contacts, may be able to put you in touch with strategically-located dentists who share your practice philosophy and vision. You might want to start by writing these individuals, outlining to them the importance of establishing a strategic alliance. Rest assured, if you take the initiative and contact these dentists, you'll likely be greeted with open arms. And as the old adage goes, you've got nothing to lose but everything to gain.

Once you've rounded up your dental soul-mates, give your group a name, appoint a chairperson and assign a treasurer. Each practice should then contribute an equal amount – payable in monthly instalments – to cover the costs of keeping the group financially afloat. You can decide on the amount, be it \$500 or \$1,000, among yourselves. (If six practices each gave \$1,000 a month, for example, \$72,000 would be raised over the course of the year. Whatever the amount, you can rest assured that the return on your investment – including the avoiding of costly mistakes and the exploiting of innovative ideas – will be a hefty one.)

The funds collected can be used for whatever the group agrees on, be it bringing in a clinician for a demonstration or spending a weekend away together for a round of meetings and leisure activities.

At the group's first meeting, put everyone's minds at ease by laying out the ground rules. It should be made clear from the start that members can't "steal" each other's staff – whether this is done blatantly or otherwise.

One of the greatest advantages of a strategic alliance is the opportunity it provides to visit and observe each other's practices, and even do some cross-training of staff. The *raison d'être*: "show and tell" is the best way to exploit each other's strengths. But the quickest way to spoil this unlimited learning exchange is to cross the fine line between observing and intruding. Be certain that all members are 100 per cent behind the "no stealing staff" rule, as it's one which is not meant to be broken.

In addition, it may be useful to have all group members sign a non-disclosure form, by which they vow to keep all group discussions in the strictest confidence. As confidants for one another, you need to feel secure that your words – and those of your colleagues – won't go beyond the meeting room's walls.

My advice is that meetings be held monthly, with a clinician's demonstration or a speaker scheduled on a quarterly basis. This will reserve three meetings out of every four to share ideas, trouble-shoot and come up with creative solutions. At the end of each meeting, group members will return to their practices with new-found enthusiasm and fresh insight on how to tackle old, nagging problems.

Between meetings, the allied dentists can connect with each other through one-on-one telephone conversations and occasional lunch meetings. A natural byproduct of these strategic alliances is the tremendous rapport that develops among the group members. Even when you're not together, you're able to contact each other to discuss any

concerns that arise and may need to be addressed before the next scheduled meeting.

A group of dentists coming together to learn from each other's mistakes and to benefit from each other's successes – that's what strategic alliances are all about. And while they'll be important in traversing the remainder of this decade, I'm convinced they'll be essential by the year 2000.

A Case in Point

Dr. John Hudson of Oshawa, Ontario, is one dentist I don't have to educate on the merits of strategic alliances. In practice for nearly 30 years, he has been in a study club for the last seven. The group evolved after its members kept showing up at the same meetings and courses.

"I kept seeing the same faces at the various meetings held by the Ontario Society for Preventive Dentistry," says Hudson. "We thought it would be good to get together and exchange ideas as we felt we had much in common. So we formed our own study club."

Hudson and his five colleagues – Drs. Jim Miles, Stan Tuck, Larry Levin, Ron Brown and Gary Kotack – meet about seven evenings a year for about four hours per session. "We're thinking about expanding the group to seven," says Hudson, "but I think that's about the limit for a small group. Any more would make reaching a consensus for the timing of our meetings totally impossible."

The dentists are strategically located, about 145 kilometres apart. As the central location is Brampton, they usually meet there (except for special meetings, such as the yearly visit to one member's ski chalet).

"Our purpose is to exchange ideas and information on both practice management and clinical issues," says Hudson. "We discuss everything from the new patient experience and current techniques to how to implement the ideal perio program."

"We have great interchange, social intercourse and strong feelings of mutual support. Even when we're not together, there is a bond between us from which we can draw strength...If any of us had a problem – of any kind – or a sensitive issue regarding our practices, we would confide in each other first. And this rapport has only strengthened over time."

Although the group uses their meetings mainly for internal discussions,

they do bring in speakers from time to time, be it a management consultant to talk about recession-proofing dental practices or an insurance expert to supply a capsule commentary.

"Often we don't have an agenda, but we develop one as soon as we arrive at the meeting," says Hudson. "But if someone has a burning issue to discuss, he'll prepare an agenda and fire it off to everybody prior to the meeting."

Most of the group members have visited each other's practices, an invaluable experience according to Hudson.

"When you see someone else's practice, things jump out at you that were not obvious before," he says. "I've often thought how insightful it would be to be *ex corpore* and just hover over my practice for a day to see what transpires. Since you can't very well do that, visit-

ing practices with similar values and *modus operandi* can be the next best thing.

"I would respectfully suggest that every dentist join a group, as I can only see benefits developing from the experience. I think dentists have a tendency to isolate themselves and be individualists. We get absorbed in our own little worlds and that's not healthy."

Hudson believes that it's comforting to have a support group "to share your concerns with and help you be objective about your aspirations, especially if you're trying to break out of your own paradigms. I've gained so much from my group..."

"The biggest bonus has been the development of close friendships. They (fellow group members) have become like family to me."

CDA Retirement Savings Plan

Unit values: (Funds are valued weekly)

Fund	Unit values as at	
	November 30, 1991	October 31, 1991
<i>Bond & Mortgage Fund</i>	90.27385	88.59603
<i>Common Stock Fund</i>	17.31094	17.13577
<i>Money Market Fund</i>	58.59945	58.08329
<i>Balanced Fund</i>	34.17338	33.65491

G.I.C. Fund Term	*Interest rates as at	
	November 30, 1991	October 31, 1991
1yr	7.35%	8.10%
2yr	7.85%	8.60%
3yr	8.35%	9.10%
4yr	8.60%	9.35%
5yr	8.60%	9.60%

*(*rates subject to change without notice.)*

Total Assets (market value) of the Plan as of

	November 30, 1991	October 31, 1991
	148,344,426.40	\$146,691,145.30

For further information:

Write :

or phone, toll free:



CDSPI

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Scarborough, Ontario
M1H 3G8

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1-800-665-9401 Service in French
1-416-296-8920 Fax.

1992 CDA ANNUAL CONVENTION

Calgary, Alberta

August 29 - September 2

CONVENTION UPDATE

The 1992 CDA Convention Committee: Committed to bringing you excellence!



The 1992 CDA Convention Committee is an energetic group of Calgarians who are willing to devote eleven months of their lives to bringing you one of the best CDA Conventions ever! They are excited and enthusiastic about welcoming the rest of Canada to their "corner of the country" and, as a team, we look forward to sharing an exciting and educational experience with you this August.

Dr. Bill Kearns, Chairman of the Scientific Program, is preparing, with the rest of the committee, a scientific program with more than 40 different lectures to be presented during the Pre-Convention and convention proper. All aspects of dentistry, including the most up-to-date information on new technologies, infection control, the amalgam controversy, and new dental materials will be addressed. The program will also include esthetic considerations in the adult and in pediatric dentistry, orthodontics, implants, endodontics, pharmacology, practice management, computers and much more.

Dr. Kearns has also secured the participation of the University of Alberta's Faculty of Dentistry, which will be celebrating its 75th anniversary in 1992. Monday, August 31st will be "University of Alberta Faculty Day".

Clinicians confirmed to date include Dr. Terry Donovan of Los Angeles, California, Dr. John Molinari of Detroit, Michigan, Dr. Roy Page of Seattle, Washington, and Dr. Alan Milnes of Toronto.

Dr. Nick Misura, Chairman of Exhibits, will have his hands full as he welcomes more than 800 exhibit personnel and oversees the set up of more than 250 booths in the spacious Roundup Centre which will house both the exhibits and the lectures during the convention proper.

Dr. Richard Odland brings vast experience in meeting planning to the team, and in addition to input in the convention proper will take charge of the Table Clinics and the Dentsply Table Clinic Student Competition.

This year's Chairman of Social Programming is Dr. Stuart Yaholnitsky. Dr. Yaholnitsky has an excellent track record for developing successful social programs in and around the Calgary area and the committee members are confident that his past experiences will ensure success! Dr. Yaholnitsky hopes to give all convention delegates a taste of the West by developing a social program that will focus on the western heritage and warm hospitality Calgarians are famous for. The opening ceremony, to be held on Sunday, August 30, will be a small-scale sample of the annual Grandstand Show hosted by the Calgary Stampede and feature local talents. Be prepared to enjoy a live 'rodeo' and a 'dance in the dirt' during the informal evening which has been designated as Monday,

August 31, while Tuesday, September 1, will feature the formal affair - the President's Gala with a western flair.

Ms. Kathy Gernhard, nominated by the Alberta Dental Hygienists' Association, to represent the Canadian Dental Hygienists' Association is working with her support staff to ensure the scientific program meets the needs of dental hygienists in Alberta and from across the country. Kathy will also be using her energy and knowledge to ensure that the 1992 CDA Annual Convention attracts a record number of dental hygienists.

The Canadian Dental Assistants' Association is represented by Ms. Barbara Peterson, who is also an instructor at the Southern Alberta Institute of Technology (SAIT). Barbara is confident the scientific and social program will address the needs of assistants and she, too, will be encouraging dental assistants to visit Calgary and update themselves.

Dr. Pauline Harrison of Calgary will be focussing on a children's program that will introduce participants to many of Calgary's local attractions - including a visit to an exciting amusement centre - Calaway Park. Lynne Kearns, Cathy Kopec and Judy Taillon have teamed up to develop a spouses' program that will attract a record number of participants while Dr. Eugene Dalla Lana will assist in the co-ordination of registration.

More details of the committee's progress will be recorded monthly right here in the *CDA Journal's* blue pages. And, of course, CDA Convention Staff are always available to serve you and provide you with more information. Just call CDA's headquarters in Ottawa if you have any questions.

We hope you will reward our efforts by planning to be with us in Calgary this August!

Michel Jahjah, DDS
General Chairman
CDA Conventions



Join us in Calgary, August 29th - September 2nd for a "Stampede" - a stampede of 'dental professionals' that is!

Photo courtesy of Calgary Convention & Visitors Bureau

1992 CDA ANNUAL CONVENTION

August 29 - September 2

Meet with the Spectacular...

Plan to attend the 1992 CDA Annual Convention this August and, at the same time, meet with the spectacular in Alberta, Canada. Fast-paced adventure awaits you in Calgary. It's a city ready to serve up an exciting potpourri of cosmopolitan sights and delights. Or, just a short drive away, explore the untouched majesty of evergreen forests and towering peaks amidst Canada's Rocky Mountains.

Calgary - A Mecca of Western Delight

Calgary, Alberta, was the sophisticated site of the 1988 Olympic Winter Games. It is also home to one of the greatest outdoor shows on earth - the Calgary Stampede.

Calgary also offers some exciting tourist attractions which you will want to experience while attending the 1992 CDA Annual Convention. Whether it's a visit to a frontier town, a wander through time with dinosaurs and over 1,400 mammals, reptiles, amphibians and birds, or the sharing of the wonder of an Olympic legacy, you will feel your heart pounding to the thrills and spills of adventure while in Calgary.

You may wish to take a vacation strolling down the rough wooden sidewalks of a frontier town at **Heritage Park Historical Village**. Located in the heart of Calgary, Canada's largest historical village brings the past to vivid life, with over 100 actual exhibits including an operating steam train, paddlewheeler and antique midway. It's a great place to share in the spirit that developed the Canadian West!

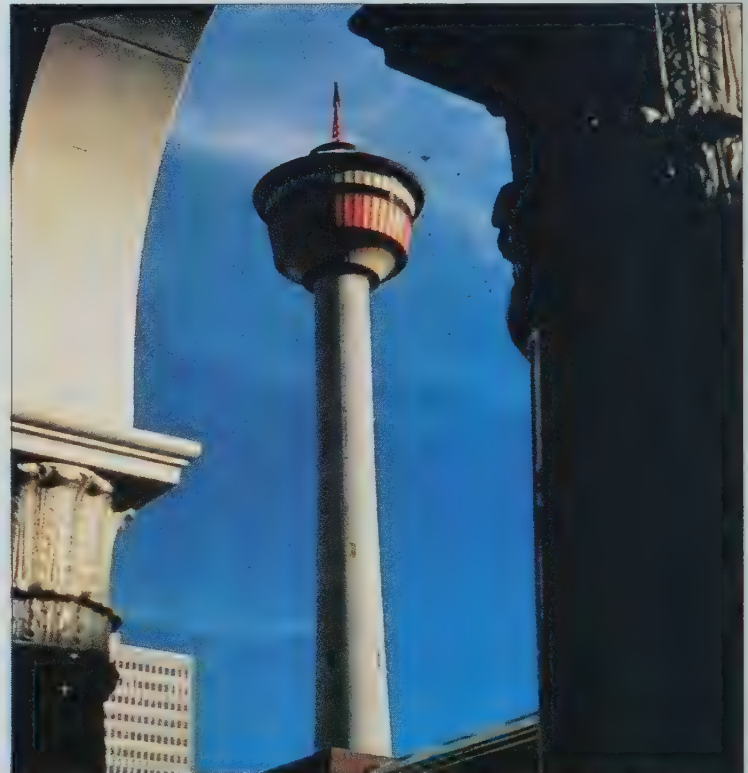
Calaway Park offers the best in family fun and entertainment. Calaway is Western Canada's largest amusement park with 20 exciting rides, many attractions and top quality live entertainment. At Calaway Park you will have the opportunity to feel the sensation of Cinema 180, catch the adventure of the Amazing Maze or experience the challenge of Pebble Beach's Mini-Golf.

For those with international pride, a visit to **Canada Olympic Park** is a must. This premier site of the 1988 Olympic Games is now a year-round attraction. Guided bus tours of the park include a visit to the observation level of the 90 Metre Ski Jump Tower and stops along the twists and turns of Canada's only Bobsled/Luge track. While at the park you may also partake in an informative site tour or visit the world's largest Olympic museum.

For a spectacular view of the city and the Rocky Mountains be sure to head over to the **Calgary Tower** - one of the city's leading tourist attractions. There you can enjoy casual elegance while dining in the revolving Panorama Dining Room. Light meals are also available in the Top of the Town Lounge and the observation deck is perfect for picture taking.

There's plenty for all to see at the **Calgary Zoo, Botanical Garden** and **Prehistoric Park** located on St. George's Island. With more than 1,400 animals, thousands of plant species and a unique prehistoric landscape, this attraction is a must for families who enjoy journeys of discovery.

The **Alberta Science Centre/Centennial Planetarium** is a triple-feature attraction. The planetarium is home to a 243-seat star chamber and a Zeiss Planetarium, where numerous special effects' projectors create a startling likeness of the cosmos. Live shows exploring Calgary skies and Laser Light concerts are also held here. The Science Centre provides insights into the amazing world of science and technology with hands-on displays, on-going demonstrations and exhibits.



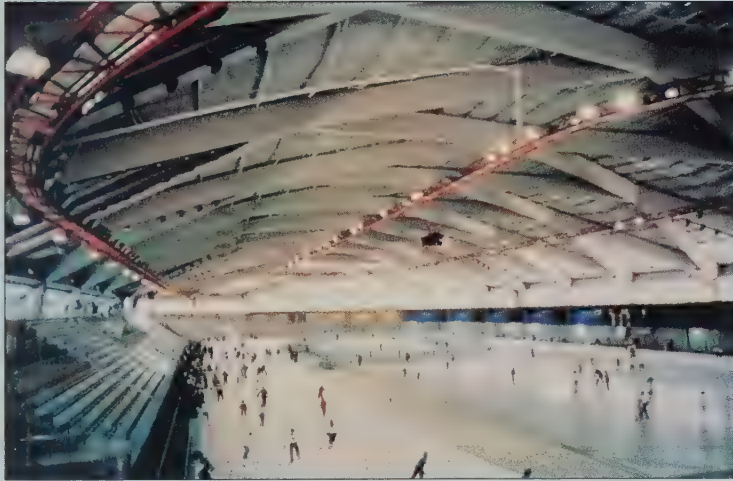
The Calgary Tower: In 63 seconds you travel 626 feet to the Observation Terrace for a breathtaking view of the city of Calgary and the spectacular Canadian Rockies in the distance.

Photo courtesy of Calgary Convention & Visitors Bureau

1992 CDA ANNUAL CONVENTION

August 29 - September 2

Meet with the Spectacular...



The Olympic Oval, the world's first fully enclosed 400 metre Olympic speed skating oval with seating for 4,000 spectators.

Photo courtesy of Calgary Convention & Visitors Bureau

A short drive from Calgary will bring you to **Head Smashed-In Buffalo Jump** - a unique historic site where for over 5,000 years the Plains Indians hunted buffalo by driving them over a 10-metre cliff to their death. This UNESCO World Heritage Site houses an interpretive centre and is open year round. It features Native guides, displays, artifacts and replicas on Plains Indian history, a theatre, gift shop, cafeteria and outdoor trails.

Another exciting day visit is a trip to the **Royal Tyrrell Museum** located 6 kilometres northwest of downtown Drumheller on the Dinosaur Trail. Located in the spectacular badlands of the Red Deer River Valley, the Royal Tyrrell Museum is Canada's only museum devoted exclusively to paleontology, the study of ancient life. Its world-renowned exhibits trace the development of life on our planet from its first primitive forms to the emergence of dinosaurs, mammals and the living world of today. The highlight of the museum is the impressive feature gallery containing 35 complete dinosaur skeletons, the largest number assembled under one roof anywhere in the world!

Home to Kananaskis Country

Kananaskis Village Resort is located one hour west of Calgary and is Alberta's newest year-round resort destination. Exciting recreation and relaxation opportunities await you in Kananaskis country - a uniquely motivating mountain playground, internationally renowned for its recreation amenities and breathtaking scenery. A host of alpine resorts offering the height of luxury, privacy and ultra-modern delights! What a great place to consider if extending your stay in Alberta either before or after the convention. Avid golfers, cyclists, hikers and tennis buffs will find paradise with all the perks in this resort region...fine international cuisine, hearty mountain fare, health clubs, indoor pools and shopping boutiques at your fingertips.

This August make plans to experience the revitalizing power of a Rocky Mountain summer while attending the 1992 CDA Annual Convention. Join us August 29 - September 2 in Calgary and let its summer sunshine energize you, your dental team and your family to new levels of performance!



From crystal-clear glacial lakes to glittering city skylines - Alberta offers you some of Canada's most spectacular sights.

Photo courtesy of Calgary Convention & Visitors Bureau.

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The DAP Advisor

The DAP Advisor offers information, ideas and advice to improve dentist/patient communication, raise awareness about good dental health, and help your practice become busier.

Phone Finesse Part 2: The Powers of Recall

Your office telephone is the lifeline of your practice. It generates much of your business and enables you to build and maintain a thriving practice. Last month, we looked at how to handle incoming phone calls, and at the basic phone skills your receptionist should know. We saw how a few simple rules of telephone etiquette can make all the difference in communicating care and concern to your patients.

This month, we will look at outgoing calls: specifically, at the phone calls your receptionist makes to remind patients that it's time for their next visit.

Recalling patients for their next appointment is one of the activities that keeps you in business. A recent survey of Canadian dentists confirmed that the telephone plays a central role in most recall efforts. In fact, it figured prominently in the recall efforts of 81 per cent of survey respondents. In most instances, the patient was phoned to make an appointment, and a reminder card was sent if the patient couldn't be reached. In other cases, the patient made an appointment at the time of the last visit, and was phoned a few days beforehand with a reminder about that appointment.

Almost without exception, the receptionist is the primary staff person responsible for recall.

A receptionist with good recall skills is invaluable to your practice, because he or she makes sure that there is always a patient ready to fill your chair. Your receptionist needs two things to be an effective recaller. She needs to know and apply the three C's of telephone etiquette – courtesy, consideration and common sense. And she needs to know the basic steps in recalling people by phone. To help her hone her recalling skills, you might want to discuss the following:

- Recall takes time – 78 per cent of the dentists who responded to the recall survey said that recalling people by phone took up to two hours of their receptionist's time each day. Because your receptionist must contend with arriving patients, incoming phone calls and whatever else is going on in your office at the same time, it's a good idea to break recall phoning up into small chunks of time. Not only does this approach provide your receptionist with some relief from constant phoning, but it leaves your line free for incoming calls.
- If you find that your receptionist has a lot of patients to call each day, and especially if the list seems to be growing, you might want to consider installing a special phone line for recall only.
- The receptionist should be aware of the best time to contact each patient on her recall list. Some people will not mind a phone call during business hours. Others may perceive it as an intrusion. Whatever the arrangement, there should be some notation beside each patient's name indicating the best time to call.
- Sometimes the patient is unable or unwilling to book an appointment in the month it is due. Your receptionist should ask the patient's permission to contact him or her again in a month's time. If the patient agrees – and he usually will – the receptionist needs a system to remind herself to follow through and phone again.
- Generally speaking, once is enough. After calling to remind the patient of his or her impending appointment, the receptionist need not remind him by phone again. Unless, of course, the patient requests it.

When your receptionist talks to patients on the phone, does she:

- speak directly into the receiver?
- hold the mouthpiece about two inches from her mouth?
- speak slowly and clearly?
- speak in a moderate tone – not too loud, not too soft?
- have appropriate inflection in her voice?
- sound like she enjoys what she's doing?



The DAP Advisor is a service of CDA's Dental Awareness Program, an ongoing campaign dedicated to helping all Canadians keep their teeth Good For Life.

Back by popular demand. This DAP Advisor was first published in February 1990 CDA Journal.

Malignant hyperthermia and the general dentist: Current recommendations

Daniel A. Haas, B.Sc., DDS, B.Sc.D., PhD, FADSA, FRCD(C)

Earle R. Young, B.Sc., DDS, B.Sc.D., M.Sc., FADSA

David G. Harper, B.Sc., DDS
Toronto

ABSTRACT

Malignant hyperthermia is a potentially fatal disease that may be triggered by the administration of specific drugs or by stress. Although most often associated with general anesthesia, stress can be a significant stimulus and is therefore of concern to the general dentist. The decision as to how and where to treat these patients is complicated by conflicting recommendations from various sources. The aim of this article is to propose a protocol for the dentist to use in the treatment of patients with a history of malignant hyperthermia. The dentist must assess the patient for both their susceptibility to a crisis and the degree of stress of the planned procedure. For non-stressful treatment, it is reasonable to assume that the general dental practitioner can treat these patients in his office. For stressful treatment, advanced preparation is advised.

SOMMAIRE

L'hyperthermie maligne peranesthésique est une maladie qui peut être fatale et qui peut être déclenchée par certaines drogues ou par le stress. Bien qu'elle soit plus généralement liée à l'anesthésie générale, le stress peut en être un stimulus important. Aussi le dentiste généraliste doit-il en tenir compte. La décision touchant les mesures pour traiter ceux qui en sont atteints n'est guère aisée à prendre, les avis divergeant à ce sujet. Dans cet article, on veut proposer au dentiste un protocole à suivre pour traiter les patients souffrant d'hyperthermie maligne peranesthésique. Le dentiste doit d'abord vérifier si le patient est sujet aux crises et évaluer le degré de stress auquel il peut le soumettre en le traitant. Pour les procédures non stressantes, on peut raisonnablement assumer que le traitement peut avoir lieu au cabinet. Pour les procédures stressantes, par contre, il vaut mieux se préparer en conséquence.

Key Words

Malignant hyperthermia; dentistry; local anesthetics; vasoconstrictors.

Introduction

Malignant hyperthermia (MH) is a genetic disease characterized by hypercatabolic reactions induced by certain drugs or by physical or emotional stress.^{1,2} This potentially fatal condition is most often associated with general anesthesia, but the capability of stress to trigger an MH reaction should not be underestimated. This is particularly true in dental patients with the commonly-found stress that may originate from fear or pain. Patients with a history of this condition may need to have their dental treatment carried out in conjunction with specific precautions. For the general dentist, the decision as to how to treat these patients to the best standard of care is complicated by conflicting recommendations from various sources. This has led to many MH patients being refused dental treatment altogether or to their receiving care that is inadequate.³ Because of these difficulties in obtaining treatment, some patients with MH are not reporting their condition to their dentists. Therefore, stringent recommendations, such as referral of all MH patients to a hospital, do not necessarily result in the patient receiving proper care.

Guidelines on the treatment of these patients have evolved over the past few years and undergone several changes, a process that will continue as more is learned about MH. The aim of this article is to propose a protocol for dentists to use when planning dental procedures for patients with this condition. The recommendations herein are based on what is currently believed to be the most accurate data, but should still be considered as guidelines only. The individual practitioner must assess the relative risks and benefits that apply to each situation, then proceed accordingly. It is

hoped that these recommendations will assist the general dentist in deciding how to treat the MH patient, thereby ensuring that he or she receives the best care possible.

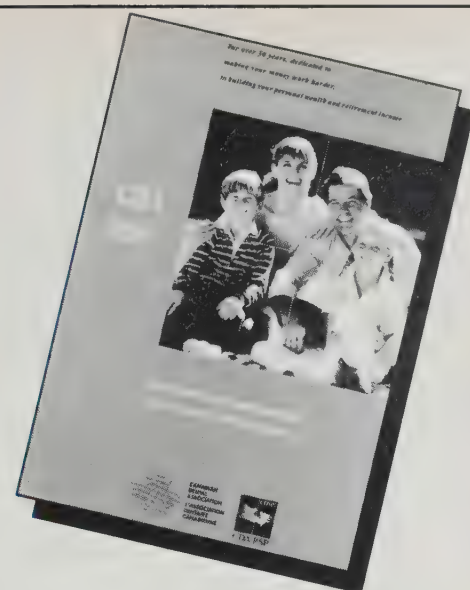
Pathophysiology

A great deal of knowledge on the pathophysiology of MH has been learned in the past decade, and most practitioners now have a high level of awareness about the disorder. Detailed discussion of this condition is available in several excellent reviews.^{1,2,4} However, prior to discussing the recommendations for treatment, a brief overview of what is known about MH may be in order.

The earliest reports of MH describe families in which numerous members died unexplainably during general anesthesia. MH is believed to be inherited as an autosomal dominant with variable expressivity^{2,4,5,6} and skipping of generations is possible.^{1,7,8} Many patients who have experienced a crisis have had previous general anesthetics without a reaction. There is one reported incidence of a patient having 12 previous anesthetics prior to an MH reaction during the 13th anesthetic. The incidence of the condition varies geographically, but is in the order of 1:15,000 for children and 1:50,000 for adults. It occurs most prominently between three and 30 years of age and appears to predominate in males.²

MH has traditionally been considered as a disease of abnormal calcium control in both excitable and non-excitable tissues.⁹ The ryanodine receptor is important in transmitting electrical impulses from the transverse tubules to the sarcoplasmic reticulum, and recently the gene that controls this was isolated. It has been suggested that in cases where this gene is abnormal, excessive amounts of calcium may be released following cell stimulation, a potential mechanism for MH.¹⁰ Not only does calcium initiate contraction-cou-

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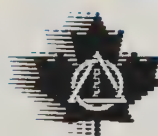
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pling in muscle, but it also activates many other metabolic processes. Numerous non-specific abnormalities of the musculoskeletal system have been reported to accompany MH. A wide variety of multi-organ system defects have been found in susceptible individuals, suggesting there may be a generalized alteration in membrane properties.^{1,2,7,10,11} Much of the research on the pathophysiology of MH has focused on porcine muscle, as susceptible pigs subjected to stresses such as slaughter, mating and fighting exhibited muscle rigidity, accelerated metabolism, high body temperature and death,⁴ all signs common to MH.

Controversy exists in testing for MH, due to gradations in severity of the clinical signs of a reaction, as well as variations in contracture phenotypes.^{4,9} A definitive diagnosis has traditionally been based on positive clinical signs followed by a positive muscle biopsy. The contracture test results following muscle biopsy relate to the genetic spectrum of susceptibility, which may in turn be modified by environment (prior exercise) and the dose of triggering agent.⁹ Currently, attempts are being made to standardize testing protocol to permit a uniform approach to muscle-biopsy contracture testing and the interpretation of results.^{10,12}

Table I summarizes some of the commonly reported clinical features that may be observed during a reaction. The diagnosis of MH may be made on the basis of the presence of any of these signs or symptoms.

Patient Assessment

For planned dental procedures, even without a general anesthetic, patients reporting a history of MH should be assessed for both their susceptibility to an MH reaction as well as the probable degree of stress induced by the dental treatment. This must include a thorough past and present medical history, the importance of which cannot be over-emphasized. If deemed necessary, a consultation with a medical or dental anesthetist, thoroughly experienced with MH, should be obtained in regards to patient diagnosis. In general, the diagnosis of MH can be either unequivocally or equivocally positive. A diagnosis of being unequivocally positive is based on a positive muscle biopsy,^{5,9} and should be assumed to be unequivocal if there has been a confirmed reaction in the patient or an immediate family member.

A diagnosis of being equivocally

TABLE I:

Some of the commonly observed features of an MH reaction. It should be noted that not all of these signs may be seen.

Feature	Comment
1. Tachycardia (unexplained) or other cardiac dysrhythmias	This is often the first clinical sign, and is caused by metabolic and circulatory stresses as well as abnormal calcium release in both cardiac and vascular smooth muscle.
2. Mottling cyanosis of skin and dark blood in the surgical field	This is due to impaired oxygenation secondary to local vasospasm, as well as respiratory and metabolic acidosis.
3. Muscle rigidity (notably the masseter muscle)	This may manifest as contractures, rigidity and/or shivering, and is due to calcium-induced contraction of skeletal muscle. It is often accompanied by an increase in membrane permeability with a rise in serum potassium, calcium, sodium, creatinine phosphokinase (CPK) and myoglobin. Tissue edema may result.
4. Unstable blood pressure	Hemodynamic abnormalities can include elevated or decreased blood pressure and unstable cardiac rhythm which can lead to cardiovascular collapse and death.
5. Elevated body temperature	The striking increase in metabolism leads to increased body heat, carbon dioxide production and anaerobic metabolism.
6. Discolored urine (coke colored)	This characteristic is due to myoglobinuria which can lead to various degrees of renal failure.
7. Coagulopathy.	Disseminated intravascular coagulopathy (DIC) is not uncommon.

positive is based on a family history of unexplained deaths from general anesthesia or a positive creatinine phosphokinase (CPK) blood test, where a muscle biopsy has not been performed. As well, it should be noted that equivocally positive patients who have the following muscle abnormalities^{9,11,13} may be considered to have increased susceptibility to an MH reaction: strabismus, ptosis, hernia, kyphoscoliosis, Duchenne muscular dystrophy, non-specific myopathies, heat stroke, family history of sudden infant death syndrome, central core disease, neuroleptic malignant syndrome and neurogenic MH syndrome. Mitral valve prolapse has even been implicated as increasing susceptibility,¹ although this notion is

not universally accepted. Muscle cramping in temperature extremes or during shivering, as well as the presence of myoglobinuria following exertion may also indicate increased susceptibility. A winter-type reaction in a patient with increased susceptibility may occur.² This is characterized by shivering, which induces muscle pain, cramps, weakness, sweating, joint pain and often low-grade fever. In these patients, cramps may be mild and infrequent (less susceptibility to an MH reaction) or continuous and incapacitating (increased susceptibility). It has been recommended that susceptible patients avoid strenuous exercise for two days prior to dental treatment,¹⁴ and where possible, active infection be controlled

TABLE II:

**Summary of MH protocol, adapted from Brebner¹⁵
Upon recognition of an MH crisis:**

1. Immediately stop all dental treatment and call in emergency measures (if not in hospital, call 911 and specify that a malignant hyperthermia crisis is occurring).
2. Hyperventilate with 100 per cent oxygen.
3. Establish an intravenous line for the administration of normal saline (preferably cold) at a rate of 10 mL/kg/hr.
4. Administer dantrolene (Dantrium™). This freeze-dried powder, 20 mg/vial, requires 60 mL of water or D₅W to dissolve. The dose is one mg/kg/hr up to 10 mg/kg total dose.
5. Continue to monitor patient (temperature, blood pressure, ECG and oximeter).
6. Administer sodium bicarbonate, one to two mEq/kg, if arterial blood gas analysis available.
7. If dysrhythmias are present, administer procainamide (Pronestyl™), 50-100 mg/min until dysrhythmia is controlled or blood pressure drops significantly.

prior to definitive treatment.⁸

The second consideration is the degree of stress that is anticipated. A stressful dental appointment would be defined as any of the following:

- a) any treatment on an apprehensive dental patient
- b) prolonged or extensive appointments
- c) traumatic surgical procedures.

Both of these factors, degree of susceptibility and stress, will influence the decision as to how to modify the dental treatment. The dentist must determine the magnitude of each of these for every patient who reports a history of MH.

Recommended Treatment Approaches

It is assumed that the dentist has an appropriate understanding of the dis-

ease prior to the treatment of any MH patient. Regardless of the degree of susceptibility, a primary determinant for modifications to dental treatment is the degree of stress as defined above.

It is our belief that treatment that is non-stressful may be rendered in any dental facility for any patient who is negative for any of the above-mentioned signs or symptoms, and has had prior uneventful routine dental treatment with local anesthesia. The likelihood of this patient having an MH reaction in the dental office would be no greater than anytime during his normal daily routine. Thus, referral of this patient to other facilities is not necessary, and perhaps may have the deleterious effect of either increasing patient anxiety or inducing them to deny their history.

Conversely, treatment that is considered stressful should be provided only in a facility that has an appropriate MH protocol in place. This response to an MH crisis should be consistent with the recommendations of Brebner,¹⁵ as summarized in **Table II**. In dentistry, stress is the most likely stimulus of an MH reaction. Therefore, the dentist must carefully assess the patient for anxiety and the degree of trauma of the planned procedure. If stress cannot be alleviated by any means, such as chairside manner or conscious sedation (see below), then the likelihood of a reaction increases.

Intermediate in nature is the highly susceptible patient undergoing non-stressful dentistry. In this situation the patient has an increased likelihood of a crisis even in daily activity. It is not reasonable to require that all of these patients be treated in facilities with an MH protocol in place. At the same time, however, because of the increased risk of a reaction, the dentist may not wish to treat this patient in his office and would prefer to transfer him to another facility. This is certainly acceptable, particularly for dentists practising in a major centre where patients have relatively easy access to dental anesthetists and hospitals. Alternatively, for dentists based in smaller centres, referral out may be an unwarranted burden for the patient, and may result in inadequate care, as already stated.³ It is our opinion that this category of patient may be treated in the dental office provided that an MH emergency protocol can be readily available. This includes having either an in-office procedure, or rapid access to a hospital with a proper MH protocol in place. For this category of patient, the dentist must carefully assess his own situation, and then decide what is appropriate.

Pharmacological Adjuncts for Stress Management

As stated above, in dentistry the most important trigger for an MH reaction is patient stress, which must be minimized from both an emotional and pain-inducing aspect. There are several approaches to alleviating stress during dental procedures, covering the range from fully conscious patients requiring no pharmacological adjuncts, to local anesthesia alone, to local anesthesia with conscious sedation, deep sedation or general anesthesia. Ideally, a good chairside manner is all that is necessary for anxiolysis, but this is often not suf-

TABLE III:

Drugs contraindicated in treating MH-susceptible patients.

Agents **ABSOLUTELY** contraindicated in suspected MH patients:

- Volatile general anesthetics, such as halothane, enflurane, isoflurane
- Succinylcholine
- Ketamine

Agents **RELATIVELY** contraindicated in suspected MH patients:

- Anticholinergics (Atropine)
- High doses of vasoconstrictors and sympathomimetics
- Calcium salts
- Cardiac glycosides (Digitalis)

ficient on its own. If pharmacologic means are necessary to reduce stress, the dentist should consider their administration, provided that he or she has the training for the specific approaches required. The dentist must consider the following factors when planning to administer any of these drugs in the MH patient, however.

Local Anesthetics

Procedures that normally require local anesthesia must be done with profound neural blockade. It has been known for some time that local anesthetics displace calcium from membrane phospholipids to initiate neuronal conduction blockade.¹⁶ Subsequent *in vitro* studies have shown that Lidocaine (an amide) but not Procaine (an ester) caused increased calcium release from the sarcoplasm reticulum of animals, but the doses used were much higher than those used in dentistry.^{1,17} As well, halothane-induced muscle contracture was potentiated by Lidocaine and actually decreased with co-administration of Procaine. These *in vitro* results have not been replicated *in vivo* in treating intact MH-susceptible animals such as pigs and humans.² Indeed, reviews of the literature have failed to yield any clear reports of MH reactions caused by the use of amide local anesthetics.^{7,8,18} Furthermore, it has recently been recommended that Lidocaine and Mepivacaine, both amides, be used as local anesthetics for diagnostic muscle biopsy.⁹ In the few cases reported in the literature implicating amide local anesthetics, the actual diagnosis was clouded by many other confounding variables. It is now accepted^{3,14,17,18,19} that amide anesthetics can be used in MH patients. Therefore, adequate anesthesia as achieved by any of the commonly used local anesthetics such as Lidocaine, Mepivacaine, Articaine or Bupivacaine is appropriate. It may be best to avoid the use of Prilocaine, as there is the potential for high doses to induce methemoglobinemia. This may mimic the cyanosis that can accompany an MH reaction and thereby confuse the diagnosis.

Vasoconstrictors

Activation of the sympathetic nervous system leads to increased output of the catecholamines epinephrine and norepinephrine. The beta-adrenergic effects can lead to calcium release in tissues, including the myocardium, while the alpha-adrenergic effects of

catecholamines in MH-susceptible swine have been shown to cause cutaneous and muscular vasoconstriction leading to hypoxia and the inability to effectively lose body heat. Controversy remains as to whether sympathetic activation actually triggers the MH reaction. It is currently believed that the widespread sympathetic dysfunction seen during an MH reaction is a secondary activity rather than a primary response.^{2,8,9} It is well known that stress alone can elicit a sympathomimetic response and that this response may be the mechanism for the stress-induced reactions, especially when accompanied by strenuous, prolonged or traumatic muscle activity. It is also accepted that catecholamine levels may increase significantly above baseline values under stressful situations. It should be cautioned, however, that even relatively small doses of epinephrine injected during a single dental appointment have resulted in significant increases in levels of circulating epinephrine above baseline.^{20,21,22,23} It has been suggested that a primarily alpha-adrenergic vasoconstrictor (phenylephrine) may be more suitable than one that also has beta-adrenergic properties like epinephrine.²⁴ This would theoretically decrease the beta-induced calcium release and possibly the undesirable tachycardia and dysrhythmia. However, it has been shown that alpha effects induce dysrhythmias both directly and indirectly, as well as causing vasoconstriction, which may, among other actions, impair heat loss.²⁵

The use of epinephrine as a vasoconstrictor with these anesthetics is, therefore, not entirely clear. For any brief procedure, it is probably best to use local anesthetic without a vasoconstrictor. However, given the strong advantage that vasoconstrictors have in aiding profound local anesthesia for dental procedures,^{16,21,26,27} it is suggested that they can be used for any procedure requiring them,¹⁸ following careful aspiration in order to avoid intravascular administration. The total dose should be kept to a minimum, and it is recommended that practitioners do not administer more than 0.04 mg of epinephrine at any one appointment. This arbitrary dose is consistent with our recommended limitations of epinephrine use in patients with a history of cardiovascular disease.

Conscious Sedation

In order to minimize emotional stress as a trigger, the apprehensive patient

may be best served by additional pharmacologic agents when it is felt that the relief of anxiety through the psychologic preparation of the patient and the behavior of the dentist are insufficient by themselves. In that case, the use of adjunctive agents such as oral benzodiazepines or inhalational nitrous oxide:oxygen (in a system used solely for that purpose) may be appropriate in order to achieve conscious sedation.

Advanced sedation or general anesthesia

For the patient facing significant stress, where conscious sedation is deemed to be insufficient, it is advisable to minimize stress through more advanced techniques of sedation. Dentists with formal postgraduate training in anesthesia may elect to induce neurolept sedation or general anesthesia through the use of any or all of the following: benzodiazepines, opioids, barbiturates, neuroleptics (each of these administered either orally or parenterally) with or without inhalational nitrous oxide:oxygen (in a system used solely for that purpose).

These patients should be monitored with an ECG, pulse oximeter, blood pressure cuff, precordial stethoscope and temperature probe (preferably on a large muscle mass), and have a patent intravenous line. An end tidal CO₂ monitor should be used for any intubated case. Emergency drugs should be readily available, including, as a minimum, oxygen, dantrolene, intravenous fluids (saline or lactated Ringer's), sodium bicarbonate and procainamide. It is recommended that a Laerdal-type bag plus oxygen source be included as part of the emergency equipment.

It is understood that none of the known absolutely contraindicated triggering agents would be used and that those that are relatively contraindicated would be used with caution. These drugs are listed in Table III. If inhalational nitrous oxide:oxygen is used, it would be delivered in a system used solely for that purpose. It is well known that volatile anesthetic agents can be taken up by the components (especially rubber) of anesthetic machines, which, even in these small quantities, may trigger an MH reaction. Although several methods of flushing the systems have been advocated, it is probably safest to use a system that is reserved solely for nitrous oxide:oxygen use. It is suggested that an adequate recovery period (in the order of two hours) be allowed for these patients.

Summary of Recommendations

For all MH patients, profound pain control is crucial and any of the amide local anesthetics may be used. A vasoconstrictor (epinephrine) can be included if deemed necessary, and if so, the dose should be kept to a minimum, preferably not exceeding 0.04 mg per appointment.

The primary considerations in planning dental management are the degree of stress involved and the patient's susceptibility to having an MH crisis. There are three possible approaches, as follows:

1. Non-stressful treatment, patient either equivocally or unequivocally positive for MH, with no signs, no symptoms and no history suggesting increased susceptibility.

In this situation, dental treatment may be carried out in any dental facility, by any dentist, with appropriate monitoring in place (visual, blood pressure, pulse).

2. Non-stressful treatment, patient unequivocally positive for MH, with signs, symptoms or history that suggest increased susceptibility.

Dental treatment may be carried out in any facility that has an appropriate MH emergency protocol in place or readily available, as outlined above, and by any dentist, as long as appropriate monitoring is in place (visual, blood pressure, pulse, temperature). To assist in diagnosis, it may be advisable to refer this type of patient to an anesthetist for a more definitive diagnosis of MH susceptibility, prior to elective dental treatment.

3. Stressful treatment, patient either equivocally or unequivocally positive for MH.

If the treatment is deemed stressful, either due to patient anxiety or the complexity of the dental procedure, the patient is best treated in a facility that has an appropriate MH emergency protocol in place as outlined in the recommendations of Brebner¹⁵ and summarized in Table II.

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Specialty Feature

The pharmacology of local anesthetics – A review of the literature

E.R. Young, B.Sc., DDS, B.Sc.D., M.Sc., FADSA
T. A. MacKenzie, MB, Ch.B., FRCP(C)

ABSTRACT

In the nineteenth century, some natives of Peru noticed circumoral numbness, euphoria and analgesia after chewing the leaves of the Erythroxylon coca bush. By 1850, cocaine was isolated from the plant, marking the start of the local anesthetic era in clinical medicine. Over the past 50 years, many synthetic local anesthetics have been developed which have fewer side effects, increased specificity of action and a wider margin of safety than cocaine. Currently, local anesthetics are used topically, for local infiltration; and intravenously, for peripheral nerve blockade, for sympathetic blockade, as well as for epidural and intrathecal use. Although the route of administration may affect pharmacokinetics and pharmacodynamics, it is the purpose of this article to review the general pharmacology of this entire range of clinically useful compounds.

SOMMAIRE

Au XIXe siècle, des autochtones du Pérou s'aperçurent qu'en mâchant des feuilles d'Erythroxylon coca, ils éprouvaient des engourdissements autour de la bouche, de l'euphorie et une perte de sensibilité à la douleur. Vers 1850, on parvenait à isoler la cocaïne de la plante, marquant ainsi le début de l'ère des anesthésiques locaux en médecine clinique. Depuis 50 ans, les chercheurs réussissent à fabriquer par synthèse divers produits anesthésiques locaux qui ont de moins en moins d'effets secondaires, dont l'action est de plus en plus spécifique et qui sont plus sûrs que la cocaïne. De nos jours, on utilise des anesthésiques topiques pour infiltration locale et des anesthésiques intraveineux pour insensibiliser des nerfs périphériques et des parties du système nerveux sympathique ainsi que pour des injections épidurales ou intrathécales. Bien que la voie d'administration touche d'abord la pharmacocinétique et la pharmacodynamie, on se propose dans cet article de passer en revue la pharma-

cologie générale de tous ces produits utiles en clinique.

Key words

Local anesthetics, pharmacology, structure, cardiotoxicity.

Basic Local Anesthetic Structure

The basic local anesthetic molecule consists of three distinct parts: the aromatic portion, which imparts lipid solubility to the molecule; the intermediate chain; and a terminal amine portion, which imparts water solubility to the molecule (Fig. 1). The aromatic portion is usually derived from a benzene ring, while the intermediate chain generally consists of four to five carbon atoms, is about six to nine angstroms (Å) in length and contains either an amide or an ester linkage. The terminal amine portion, when present, is either secondary (2°) or tertiary (3°), is apparently derived from ethanol or acetic acid and is that portion of the molecule which is usually combined with a strong acid to form a stable, water soluble molecule. As a general rule, carbon atoms can be added to either of these three portions (up to a certain maximum number), thus altering protein binding, lipid solubility and the manner in which the molecule is metabolized.

Chemical Groups

Local anesthetics are categorized into two main chemical groups – amino esters or esters and the amino amides or amides – on the basis of their chemical structure, the manner in which they are metabolized and their allergy-producing potential.

(a) The Esters

The aromatic portion of the ester local anesthetics is derived from para-aminobenzoic acid (PABA). The intermediate chain which characterizes this

major chemical group includes an ester linkage. The esters are metabolized (hydrolysed) in the plasma by the enzyme pseudocholinesterase forming PABA derivatives, which are excreted largely unchanged in the urine, as well as diethylamino alcohol, which undergoes further metabolism in the liver. About two per cent of the ester molecules are excreted unchanged in the urine.¹¹ Because of the PABA derivatives, the ester local anesthetics have a relatively high potential for causing allergic reactions. Some examples of the ester local anesthetics are listed in Table I. It is interesting to note that the Benzocaine molecule does not contain a terminal amine portion, hence it is quite water insoluble and is therefore useful only for topical application, primarily on mucous membrane.

(b) The Amides

The second major classification of local anesthetics is the amide group. Some commonly used examples of amide local anesthetics are shown in Fig. 1. The most important feature of this classification is that the intermediate chain contains an amide linkage. The amide local anesthetics may be further subdivided into three major sub-classifications.

(i) the Xylidine derivatives are all tertiary amines, with the aromatic portion of the molecule containing two methyl groups. Table II lists the commonly used xylidine local anesthetics whose structures are shown in Fig. 1.

As can be seen, the tertiary amine portion of Mepivacaine is a piperidine ring containing a methyl group, while Bupivacaine contains a similar piperidine ring with a butyl group attached. The increase in carbon atoms in Bupivacaine contributes to its increased potency and duration of action.

(ii) The Toluidine derivatives are the second major subclassification of the amide local anesthetics. In this group, the benzene ring contains a single methyl group and the amine portion is secondary in structure. Prilocaine (Ci-

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*WET OR (MOIST) DOES NOT MEAN SALIVA CONTAMINATION

tanest) is a commonly used example.

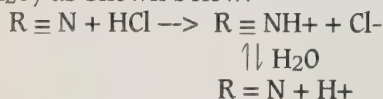
(iii) A third sub-classification of the amide local anesthetics is the Thiophene group. It includes the new local anesthetic, Articaine (Ultracaine) which is somewhat unusual in that its aromatic portion is a sulfur-containing thiophene derivative which possibly imparts improved penetrating properties to this molecule.²⁰

The amide local anesthetics are metabolized primarily in the liver by phase 1 reactions on the cytochrome P₄₅₀ system which is located on the smooth endoplasmic reticulum (SER). These reactions are followed by conjugation-type phase 2 reactions, with the resultant water soluble metabolites being excreted by the kidney. Between 70 and 90 per cent of amides are metabolized, with 10 to 30 per cent being excreted unchanged by the kidney.¹¹

While the above method of classifying local anesthetics is based on their molecular structure, **Table III** shows a second commonly-described method of classifying local anesthetics, based on potency and on duration of action.

Preparation of the Local Anesthetic Solution

Cartwright and Fyhr have described the manufacture and storage of local anesthetic solutions in considerable detail.⁶ In summary, the local anesthetic molecule is weakly basic, unstable and poorly water soluble and, as mentioned, is usually a tertiary amine. This tertiary amine portion can be represented diagrammatically as $R \equiv N$, and is usually combined with hydrochloric acid (HCl) and then dissolved in distilled water (H₂O) as shown below.



In this chemical preparation, $R \equiv NH^+$ represents the active charged quaternary cationic form of the molecule which, as can be seen, is in equilibrium with the uncharged base form ($R \equiv N$). The base form of the local anesthetic molecule is the form of the molecule *initially* required for diffusion to the site of action and for actual penetration into the lipid part of the nerve membrane, and is therefore referred to as the lipid soluble form of the molecule. Once in the nerve membrane, because of the lower intracellular pH, this unchanged base form of the local anesthetic molecule re-equilibrates forming more of the charged cationic form ($R \equiv NH^+$), the

TABLE I:

Some of the commonly used ester local anesthetics. The trade names are shown in brackets.

Cocaine	
Procaine	(Novocaine)
Tetracaine	(Pontocaine)
2-chloroprocaine	(Nesacaine)
Benzocaine	(Hurricane, Americaine)
Propoxycaine	(Ravocaine)

TABLE II:

Some of the commonly used xylylidine derivative amide local anesthetics. The trade names are shown in brackets.

Lidocaine	(Xylocaine)
Mepivacaine	(Carbocaine, Isocaine)
Bupivacaine	(Marcaine)
Etidocaine	(Duranest)

TABLE III:

A second method of classifying local anesthetics on the basis of inherent potency and duration of action.

Low Potency/Short Duration	
- Procaine	(Novocaine)
- 2 chloro procaine	(Nesacaine)
Intermediate Potency/Intermediate Duration	
- Lidocaine	(Xylocaine)
- Prilocaine	(Citanest)
- Mepivacaine	(Carbocaine, Isocaine)
- Articaine	(Ultracaine)
High Potency/Long Duration	
- Tetracaine	(Pontocaine)
- Bupivacaine	(Marcaine)
- Etidocaine	(Duranest)

"active" form of the local anesthetic molecule. The relative proportion of base form and cationic form of the local anesthetic molecule is determined by the pK_a – the ionization constant of the molecule – as well as by the pH of the local anesthetic solution, and by the pH at the site of injection as defined by the Henderson-Hasselbach equation.^{7,9,11}

The pK_a's of some commonly used local anesthetics are shown in **Fig. 1**. As a general rule, the closer numerically the pK_a is to the pH at the site of injection, the higher the percentage of uncharged base form of the local anesthetic molecule – that form initially required for non-nervous diffusion and penetration into the nerve membrane. Thus, by

TABLE IV:

An example of the effects of altering pH or of choosing a local anesthetic of different pKa on the percentage of uncharged (base) form of the local anesthetic molecule.⁷

pKa	Percentage shown is the Uncharged (Base) Form at		
	pH = 7.0	pH = 7.4	pH = 7.8
7.6 (Mepivacaine)	20.0	39.0	61.0
8.1 (Bupivacaine)	7.0	17.0	33.0
8.9 (Procaine)	1.0	3.0	7.0

either choosing a local anesthetic with a lower pKa or by raising the pH of the local anesthetic solution, or of the tissues at the site of injection, one is left with a higher percentage of the lipid-soluble uncharged form of the molecule. This is illustrated in Table IV.

There are several other major additions which may be present in a local anesthetic solution. These include:

(a) Methylparaben (1 mg/mL) is an anti-bacterial preservative present in multi-dose vials. Because of its structural similarity to para-amino benzoic acid (PABA), it has a well-documented potential for causing allergic reactions.^{7,11}

(b) Bisulphite (0.5 - 2.0 mg/mL) is the major anti-oxidant which is required for the vasoconstrictor (usually epinephrine) - if one is used. Not only does this compound lower the pH of the solution, but allergies have been reported to this additive.^{2,3,25} Some controversy has been raised with respect to the ester local anesthetic 2-chloroprocaine (Nesacaine) and its alleged potential for causing neurotoxicity. It is now thought that the very low pH of the solution causes the bisulphite anti-oxidant to form sulphur dioxide (SO₂), which penetrates into the nerve membrane and then forms sulphurous acid (believed to cause the neural damage).⁹ Currently, solutions of 2-chloroprocaine are prepared at a higher pH than previously, and with a lower concentration of bisulphite, and the new preparation appears free from neurotoxic effects.

(c) Instead of being prepared as salts of HCl, local anesthetics have been variously prepared as salts of carbon dioxide (CO₂). These solutions have a higher pH than the HCl preparations, thus requiring less tissue buffering, and favor the formation of more of the uncharged

base form of the local anesthetic molecule. As the CO₂ diffuses intracellularly, it is thought to significantly lower the intracellular pH, thus favoring re-equilibration with resultant intracellular formation of large quantities of the active charged cationic form of the molecule.^{5,16} These solutions are said to result in faster onset and a more profound block.^{5,24,26} Although there has been some controversy because of the possible increased toxicity of these solutions, this controversy appears more theoretical than real.

(d) Local anesthetics have often been prepared with various forms of Dextran.^{5,24,26} These solutions have a higher pH, and it is thought that the dextran forms a macromolecular complex with the local anesthetic molecule, thus increasing the local anesthetic's duration of action. The success of these solutions has not been consistent, however.

(e) Sodium bicarbonate (NaHCO₃) has been added to local anesthetics in an attempt to raise the pH, thus favoring the formation of more of the uncharged base form of the molecule.^{5,17}

(f) Potassium (K⁺) has been added to the local anesthetic solution. This raises the nerves' resting membrane potential (RMP), thus potentiating the action of the local anesthetic, but it may also increase the potential for toxicity.^{1,5,7}

Mechanism of Action of Local Anesthetics

While numerous mechanisms of action have been proposed,^{7,11} it is generally agreed that the commonly used local anesthetics work by membrane expansion and internal sodium channel receptor stimulation. It is thought that the lipid soluble, uncharged base form of the local anesthetic molecule penetrates the lipid portion of the nerve membrane, causing mechanical distortion of the sodium channel. Between one and five per cent expansion of the nerve membrane is thought to occur, the higher number for the more lipid soluble local anesthetic molecules. This membrane expansion is thought to account for about 10 per cent of the total action of the commonly-used agents. The remaining 90 per cent of the action is thought to be due to combination of the charged cation form of the molecule with the nerve membrane phospholipid phosphatidyl-L-serine, causing calcium displacement and resultant sodium channel closure. The entire process is called conduction blockade or mem-

	CHEMICAL STRUCTURE			Lipid Solubility	Protein Binding	pKa	In Vitro Potency	Anaesthetic Duration	Onset Time
	Aromatic End	Intermediate Chain	Amine End						
<u>Amino esters</u>									
Procaine				1	5	8.9	1	Short	Slow
2-Chloroprocaine				1	?	9.1	2	Short	Fast
Tetracaine				80	85	8.6	16	Long	Slow
<u>Amino Amides</u>									
Lidocaine				4	65	7.7	4	Moderate	Fast
Prilocaine				15	55	7.7	3	Moderate	Fast
Etidocaine				140	95	7.7	16	Long	Fast
Mepivacaine				1	75	7.6	2	Moderate	Fast
Bupivacaine				30	95	8.1	16	Long	Moderate

Fig. 1: Clinical structure and some of the pharmacologic properties of some of the commonly used local anesthetics.

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TABLE V:

Some factors which may modify a local anesthetic's intrinsic *in vivo* potency

FACTOR	COMMENT
Pregnancy	Progesterone may enhance the inherent neuronal blocking properties of local anesthetics. ^{18,27} This may lead to enhanced toxic effects during pregnancy, as has been seen with Bupivacaine. ^{22,27}
pH at the site of injection	Infection, uremia, etc., lowers tissue pH, thus decreasing the amount of diffusible uncharged base form of the local anesthetic molecule. Changes in pH may also alter local anesthetic binding to plasma and tissue proteins. ^{7,11}
Nerve type, size, sheaths	Represent barriers for local anesthetic diffusion; generally C_M of sensory fibres is less than the C_M of motor fibres. ^{10,15}
Rate of stimulus	The higher the stimulus frequency, the more susceptible the nerve is to conduction blockade. ⁷
Tachyphylaxis (rapid onset of tolerance with repeat injection)	Many factors have been proposed, one of which appears to be due to the low pH of the local anesthetic solution which causes a progressive decrease in the proportion of the uncharged base form of the molecule. ^{7,11}
Sequestration	A very lipid soluble molecule (e.g. Etidocaine) may not even reach the nerve due to sequestration in non-nervous fat. ^{5,7}
Non-nervous diffusion	Related to the amount of uncharged base form of the molecule as well as to the shape of the molecule. Linear molecules (Lidocaine) are said to diffuse more readily than the spherical molecules (Mepivacaine, Bupivacaine). The Thiophene nucleus of Articaine is said to enhance diffusion. ²⁰
Inherent vasodilatory properties	Inherently vasodilating molecules like Bupivacaine may be quickly removed from the site of action by the enhanced blood flow. ⁷
Vasoconstrictor	A vasoconstrictor will offset the inherent vasodilatory properties and generally produces a more "profound" block of longer duration. ⁷

brane stabilization, and involves a decrease in sodium conduction, a decrease in the rate of depolarization, a failure to achieve threshold and thus a failure to form a propagated action potential. Resting membrane potential, threshold

potential and repolarization are for the most part unaffected.

Intrinsic Properties of Conduction Blockade

Covino^{7,8,9} has described three intrinsic

properties of conduction blockade: potency, onset and duration.

i) Potency of local anesthetics appears directly proportional to the local anesthetic's lipid solubility as described by Seaman's concentration rule. Potency can be expressed as C_M , the minimum concentration of local anesthetic required to produce, within five minutes, a 50 per cent reduction in action potential amplitude in a solution of pH 7.2 - 7.4 and a stimulus frequency of 30 pulses per second.^{7,10} This is, of course, an *in vitro* experimental definition.

Lipid solubilities of various local anesthetics can be ranked as follows: etidocaine > tetracaine > bupivacaine > lidocaine > prilocaine > mepivacaine > procaine.^{7,9} While *in vitro* potencies can be determined almost exclusively by lipid solubility, actual *in vivo* potencies may be modified by other factors (Table V).

ii) Time of onset is the second intrinsic property of conduction blockade, as described by Covino. Generally speaking, the lower the molecules' pKa's (or the higher the pH at the site of injection), the faster the onset. When pKa's are similar, the molecule with the greater lipid solubility will exhibit the fastest onset.^{7,11} Over the commonly used clinical range, total dose (mg) will indirectly affect the time of onset - with volume (mL) affecting spread, and concentration (mg/mL) affecting profoundness of the block.¹⁰

iii) The third intrinsic property of conduction blockade is the duration of action of the local anesthetics. Total dose, especially the log dose, lipid solubility and the presence of a vasoconstrictor, appear to directly affect duration of action. For example, doubling the total dose increases duration by about one half life.²⁸ The presence of a vasoconstrictor is a more important factor for increasing the duration of short and intermediate acting local anesthetics than it is where long acting local anesthetics are concerned (Table III). Local anesthetics bind to both plasma proteins and tissue proteins, but most of our current specific knowledge of drug binding involves the plasma proteins. Local anesthetics bind primarily to globulins (such as α_1 -acid glycoprotein), red blood cells and only minimally to albumin.^{11,28} Bupivacaine and Tetracaine are highly plasma protein bound (> 90 per cent), while Mepivacaine, Lidocaine and Prilocaine are less so (80 per cent, 60 per cent and 55 per cent respectively). Generally, the higher the plasma protein binding, the longer the duration of action. Local anesthetics

TABLE VI:

Summary of the effects of increasing total dose (either concentration and/or volume) on the various intrinsic properties of conduction blockade.

Time of Onset	decreased
Degree of Motor Block	increased — particularly concentration dependent (C_M)
Degree of Sensory Block	increased — particularly concentration dependent (C_M)
Duration of Action	increased
Peak Plasma Concentration	increased
Area of Blockade	increased — particularly volume dependent

TABLE VII:

Half lives of the plasma distribution phases of some commonly used local anesthetics.

	Lidocaine	Mepivacaine	Prilocaine	Bupivacaine
T1/2 (second)	60	40	29	160
T1/2 B (minutes)	96	114	93	200
T1/2 (hours)	1.5	2.0	1.2	3.5

TABLE VIII:

Maximum recommended per-appointment safe doses of local anesthetics for a healthy 70 kg adult. Note that doses must be "individualized."

	Plain Solution	Epinephrine Containing Solution
Lidocaine	300 mg	500 mg
Prilocaine	600 mg	600 mg
Mepivacaine	300 mg	500 mg
Bupivacaine	175 mg	225 mg
Tetracaine	<150 mg	200 mg

such as Prilocaine, which have a relatively low binding to plasma proteins, may be "permitted" high binding to tissue proteins, thus lowering potential toxicity-producing blood levels (larger volume of distribution).^{8,30}

Table VI summarizes Cousins and

Mathers¹⁰ paper describing how increasing the total dose of injected local anesthetics affects some of the intrinsic properties of conduction blockade.

Pharmacokinetics

Following the injection of local anes-

thetics into body tissue, they are ultimately removed from the site of injection by the blood. The resultant blood levels are affected directly by the site of injection (vascularity), speed of injection, (especially in vascular areas), inherent properties of the drug — such as inherent vasodilatory properties — and by the total injected dose. If the *same* drug dose is injected at different concentrations and volumes, then the highest peak blood levels tend to result from the highest concentration, lowest volume preparation.^{8,10} The use of a vasoconstrictor reduces peak blood levels following injection, resulting in prolonged duration of action and a reduced incidence of toxicity.

The local anesthetic that is absorbed by the blood subsequently disappears from blood according to a three-phase plasma disappearance curve.^{8,10,29,30} The fast initial alpha phase represents redistribution to vessel rich groups, the slower beta phase represents redistribution to poorly perfused tissue, while the slowest gamma phase represents drug metabolism and excretion. Generally speaking, these phases are faster for the more lipid soluble, poorly protein-bound local anesthetics. They may also be modified by patient factors.⁸ The patient with congestive heart failure, for example, has slower alpha, beta and gamma phases and therefore slowed hepatic clearance, metabolism and excretion.^{8,28} Table VII illustrates the half lives of these phases in healthy subjects for some of the commonly used local anesthetics.^{8,30}

It should be noted that Prilocaine (Citanest) exhibits the fastest redistribution phases, the highest hepatic extraction ratio and metabolism, and also shows significant extra-hepatic metabolism in lung and kidney.^{7,30} It is also the least inherently vasodilating local anesthetic and is the least plasma protein bound (hence a large volume of distribution) — all factors which are said to make it 60 per cent less toxic than all other local anesthetics.³⁰ Prilocaine has one potential disadvantage in that one of its metabolites, ortho-toluidine, can oxidize the ferrous iron in hemoglobin to the ferric form (met Hb), decreasing its oxygen carrying capacity. Greater than 1.5 grams met Hb/100 mL of blood is considered clinically to be methemoglobinemia and at this level may manifest as cyanosis. The oxygen dissociation curve for the remaining hemoglobin is not changed.¹¹ Not until levels reach five grams Met Hb/100 mL blood, would the otherwise healthy patient be-

gin to exhibit shortness of breath and dyspnea.^{13,19} It is felt that up to 600 mg of Prilocaine are safe in a normal, healthy patient, but that lower levels should be used in the presence of anemia, oxidizing drugs, certain hemoglobinopathies, G-6-P Dehydrogenase deficiency, or the rare autosomal recessive NADH-dependent methemoglobin reductase deficiency.^{7,11,13,19}

Local Anesthetic Toxicity

Toxicity to local anesthetics appears related to *peak* blood levels and to the intrinsic potency of the agent.⁷ Patient age, size, pathology, acid-base status and concurrent medications may modify these factors.^{1,17} Table VIII shows some safe per-appointment maximum recommended doses for local anesthetics. These, of course, should be individualized on the basis of the patient's present and past medical history, as well as a physical examination. Interaction with drugs known to lower the seizure threshold of the local anesthetics, such as antihistaminics and synthetic narcotics, should be taken into account. Early signs of toxicity manifest due to high blood levels in vascular areas with membrane stabilization of nervous tissue in these areas. These premonitory signs include circumoral numbness and numbness of the tongue. Drowsiness is a true central nervous system (CNS) premonitory sign and may be at least partially due to a central anti-cholinergic effect.¹¹ Apart from initial drowsiness, the initial CNS effects are due to the local anesthetic crossing the blood brain barrier and frequently manifest as excitatory phenomena. These may include hypertension and tachycardia due to direct stimulation of the vasomotor center. While all local anesthetics, except cocaine, are thought to be inherent vasodilators, an initial vasoconstriction may occur due to calcium displacement from membrane phospholipids. This has been reported most often with Prilocaine and Mepivacaine.^{10,11} Other excitatory phenomena include talkativeness, dizziness, visual and auditory disturbances, bronchodilation (peripherally and centrally mediated), slurred speech, twitching, tremors and frank tonic clonic seizures which appear to originate in the amygdala.^{7,11}

Where as the excitatory phase is due, at least in part, to apparent selective inhibition of inhibitory neurons throughout the CNS, the later "depressive phase" of toxicity is thought to be due to a more global depression and

TABLE IX:

An example of the gradation in apparent toxic effects for lidocaine as blood levels progressively increase.

Lidocaine Absolute Blood Levels μ g/mL	30 <—	Cardiovascular collapse, direct vasodilation, direct cardiac depression, central depressive effects
	20 <—	Respiratory arrest
	15 <—	Loss of consciousness ("depressive" phase)
	10 <—	"Excitatory phenomena" including convulsions
	6 <—	Anti-dysrhythmic level. Premonitory signs including drowsiness, visual disturbances, circumoral numbness
	2	
	0	

may result in loss of consciousness, respiratory depression, perhaps a degree of ganglionic blockade and, finally, cardiovascular collapse. An example of this dose-related gradation of toxic effects can be seen in Table IX for Lidocaine.¹⁰

Cardiac Toxicity

Because of several reported obstetric deaths following the epidural administration of 0.75 per cent Bupivacaine, there has been renewed interest in local anesthetics and cardiotoxicity.²² A review of some of the recent literature has produced some interesting conclusions:

1) The overall toxicity of local anesthetics is directly proportional to their inherent potencies.^{4,7,10}

2) All local anesthetics produce a direct and concentration-related depression of intra-atrial, atrioventricular (AV) nodal and intraventricular conduction and contractility.⁴

3) Tetracaine exhibited the highest intrinsic potency on nerve conduction and was also the most potent depressant on cardiac conduction and contractility.^{4,21}

4) Prilocaine tends to cause the least depression of intra-atrial and intraventricular conduction.^{4,30}

5) Lidocaine is the least negatively inotropic local anesthetic.^{4,14}

6) The AV node appears to be the most resistant to the depressant effects of all local anesthetics.⁴

7) Bupivacaine decreases the slope of phase 0 (V_{max}) more than Lidocaine. The same can be said for the depression

of the slope of phase 4 in pacemaker cells (automaticity).^{23,29}

8) The toxicity profiles of the more potent local anesthetics such as Bupivacaine show that less difference exists between doses required for CNS toxicity and cardiovascular toxicity.^{4,27}

9) Convulsions caused by Bupivacaine are of longer duration and cause more catecholamine release than Lidocaine-induced convulsions.^{4,22}

10) Hypoxia, hypercarbia, acidosis and hyperkalemia tend to enhance the cardiodepressant actions of Bupivacaine more than Lidocaine.¹²

11) Bupivacaine rapidly depressed the rapid phase of depolarization (Phase 0) in isolated guinea pig papillary muscle and the rate of recovery was extremely slow, suggesting that Bupivacaine may produce unidirectional block.^{4,12,27}

12) Convulsant doses of Bupivacaine produce aberrant intraventricular conduction.^{4,22,27}

13) Bupivacaine reduced the diastolic membrane potential (less negative) while Lidocaine did not. As well, Bupivacaine significantly decreased action potential duration, while marked abnormalities of the action potential morphology were noted following Bupivacaine administration.^{4,27}

14) Bupivacaine has been called a "fast in, slow out" local anesthetic. Because of its high lipid solubility and high protein binding, one could theorize maximum penetration and binding within the sodium channel. The piperidine ring portion may actually flip

TABLE X:

Other reported actions of local anesthetics^{7,9,10,11}

Effect	Comment
Anti-bacterial action	Concentration related
Anti-cholinergic effect	Central and peripheral
Ganglion Blockade	May contribute to cardiovascular collapse
Neuromuscular blockade	Clinically significant at high doses, which may be significant in Myasthenia gravis, for example 2-4 µg/mL levels (1-2 mg/kg iv) may also produce a concomitant drowsiness.
Anti-convulsant	Central anti-cholinergic mechanism possible
Analgesia, anti-tussive, anti-pyretic	Central and peripheral effects have been proposed
Placental transfer	Inversely proportional to maternal plasma protein binding
Anti-platelet effect	Reduced thrombosis may result

back on itself, making exit from the channel slower, and perhaps contributing to the "slow out" effect.^{4,11,22,27}

15) Most local anesthetics tend to increase the ratio of effective refractory period (ERP) to action potential (AP) duration, helping to explain the anti-dysrhythmic properties of such clinically useful agents as Lidocaine.²⁹

Other Properties of Local Anesthetics

Aside from the important effects of conduction blockade or membrane stabilization, and hence analgesia – the most clinically useful property of local anesthetics – anesthetics have been shown to have other actions as described in Table X.

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Quote

"Before you give somebody a piece of your mind, make sure you can get by with what you have left"

Anonymous

A review of dry socket: A double-blind study on the effectiveness of clindamycin in reducing the incidence of dry socket

Paul Chapnick, DDS, FRCD(C)

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Boston

ABSTRACT

This double blind clinical study was undertaken to evaluate the effectiveness of locally applied clindamycin in Gelfoam* in reducing the incidence of dry socket formation after third molar surgery. A total of 1,021 third molar extractions were performed, and 520 mandibular third molar extractions of varied surgical difficulty were evaluated. The results indicated that this technique was effective. This study also demonstrates that the incidence of dry socket after third molar surgery is significantly higher in the mandible than the maxilla, in smokers than in non-smokers, and in females currently on oral contraceptives.*

SOMMAIRE

On a effectué une étude clinique en double aveugle pour savoir si la clindamycine contenue dans le produit Gelfoam (marque de commerce) appliqué localement est efficace pour réduire l'incidence de l'alvéolite sèche après extraction des dents de sagesse. Dans le cadre de cette étude, on a extrait 1 021 dents de sagesse en tout dont 520 à la mandibule qui ont posé divers problèmes chirurgicaux. Les résultats ont démontré que la clindamycine est efficace et, de plus, que l'incidence de l'alvéolite sèche est beaucoup plus élevée pour la mandibule que pour le maxillaire, chez les fumeurs que chez les non fumeurs et chez les femmes qui prennent des contraceptifs.

Introduction

One of the most common postoperative complications following tooth extraction is a condition known as dry socket. This term has been used in the literature since 1896, when it was first described by Crawford. Since then, several other terms have been used in re-

ferring to this condition, such as localized osteitis, alveolar osteitis, alveolitis sicca dolorosa, localized acute alveolar osteomyelitis, postoperative osteomyelitis, postextraction alveolar osteitis, postextraction osteomyelitic syndrome and fibrinolytic alveolitis.

The diagnosis of dry socket is routinely simplified by the classical signs and symptoms which usually begin two to four days postextraction and can last for several days to weeks. Dry socket is characterized by an intense continuous pain which may radiate to the ear, temporal region or the eye. Local gingival irritation, production of a foul, fetid odor and ipsilateral regional lymphadenopathy are noted along with the presence of a disintegrating or necrotic blood clot. However, there is no evidence of suppuration and seldom signs of pyrexia. Trismus is a rare occurrence, but in cases of third molar extractions it is sometimes seen and is probably due to lengthy and traumatic surgery. Lack of proper nutrition and sleep secondary to local complaints contribute to the overall clinical picture.

Incidence

The reported incidence of dry socket has varied greatly from one study to another. It has been reported as low as 0.5 per cent² and as high as 68.4 per cent³ for all extractions, with an average of approximately three per cent.⁴⁻⁶ Studies that have included the removal of all 32 teeth have shown the incidence of dry socket to be two to five per cent.⁷⁻⁹ This complication can occur in any operative site; however, first and third mandibular molars show the highest incidence, followed by maxillary second molars, mandibular second molars, maxillary premolars, maxillary first molars, mandibular premolars and maxillary third molars.¹⁰ Thus, simply stated, dry socket will occur more frequently after the extraction of mandibular teeth and most frequently with mandibular

third molars,^{5,6,9,11} occurring with an incidence of 9.1 per cent to 30 per cent.^{12,13}

This great variability in the reported incidence of dry socket may be due to differences in diagnostic criteria; in intraoperative and postoperative management of extraction sites; in patient populations with respect to age, medical status or tooth positions; or to surgical techniques or surgical skill.¹⁴ It is also interesting to note that dry socket will not occur as often in single-surgeon and private-practice studies as in multiple-surgeon and institutional studies.¹⁴ The authors also note that it will tend to occur in sporadic episodes; a few cases will be seen over the course of one to two weeks and then no cases will be seen for possibly another one to two months.

Etiology and Predisposing Factors

The etiology and pathogenesis of dry socket have been the subject of much study and debate since the condition was first recognized. Most authors feel that it is of multifactorial origin, but a few also believe that a specific cause exists. A variety of possible predisposing conditions have been reported in the literature and are as follows:

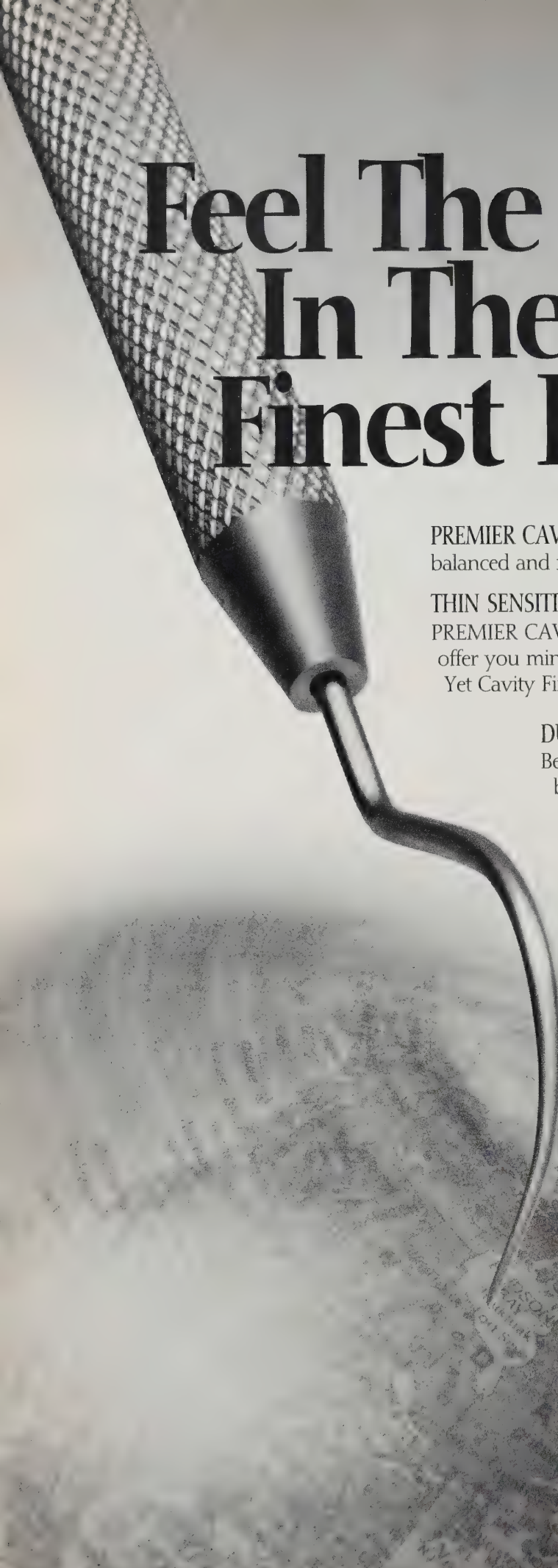
1) Anatomic Location

It has already been stated that the mandibular teeth have a higher likelihood of developing dry socket than do maxillary teeth. It should also be noted that the tendency for its occurrence is also generally higher in the posterior regions than in the anterior.⁵

2) Difficulty, Duration, and Trauma During Surgery

There is a definite correlation between the occurrence of dry socket and the mechanical difficulty of tooth removal.^{10,15,16}

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resulting in fractured teeth produce a significantly higher rate.⁵ Surgical extractions that involve the reflection of a flap and possible sectioning of the tooth with some degree of bone removal are also more likely to develop dry socket.¹²

One interesting study indicates that less-experienced surgeons had a significantly higher incidence of complications after the removal of impacted third molars; the most common complication being dry socket.¹⁴ Dense bone and hypercementosis, which can complicate surgery, favored the occurrence of dry socket.¹⁷ On the other hand, some studies have reported no difference in occurrence rate according to the type of flaps or the length of time required for surgery,^{18,19} and that the length of the operation is not a positive contributing factor.

3) Smoking

It has been reported that smokers are four times more likely to develop dry socket than nonsmokers after the surgical removal of mandibular third molars.²⁰ This increase in incidence may be due to the dislodging of the clot by the act of smoking – the removal of the clot by suction.²¹ A patient who resumes smoking within a 24-hour period after an extraction greatly enhances his or her chances of developing dry socket.^{18,20} Whether it may be the contamination of the surgical site, systemic effects on the clotting mechanism, heat or the disturbance of the existing clot, the reasons for the effect that is seen with smoking have not yet been positively established.

Conversely, some authors indicate that smoking is not a significant factor in the development of postoperative pain and dry socket.²² They have claimed that systemic fibrinolytic activity is not a major etiological factor, because the fibrinolytic system is actually depressed in heavy smokers.²³ Therefore, one would expect to see an increase in dry socket in nonsmokers.

4) Age

The age of the patient has been linked to the incidence of dry socket. Its occurrence seems to be age-dependent, with a peak in one study in the 40-45 year-old group.²⁴ Most reported cases generally occur between the ages of 20-40.^{5,25,26} However, it must be noted that the majority of patients requiring extractions fall into this age group.

5) Sex of Patient and Oral Contraceptives

Females have been reported to have

an increase of dry socket two to 20 per cent higher than males regardless of whether or not they were taking oral contraceptives.^{5,12,18} However, prior to 1960, some studies revealed that there was no difference in the incidence of dry socket between males and females,^{15,26} but it was later seen that a significant difference of 50 per cent higher incidence in females existed.⁵ This occurrence was explained in a report²⁷ as being due to the fact that before 1960 oral contraceptives were not appreciably used. But as they became increasingly popular and widely available, more women began using them and the incidence of dry socket in females was elevated. Thus, there seems to be definite positive correlation between the use of oral contraceptives and the incidence of dry socket.

More recent papers indicate that dry socket, in addition to postextraction pain and trismus, tends to occur more frequently in patients taking oral contraceptives.^{12, 28, 30} Estrogens, particularly in oral contraceptives, have effects on both the coagulation system and the fibrinolytic system.^{31,32} Females on these medications demonstrate higher fibrinolytic activity than those who are not.³¹ This increased activity usually begins within 24 hours of administration of the first dose of an oral contraceptive; a rapid fall will occur shortly after its discontinuation.³¹ Estrogens, like pyrogens and other drugs, will activate the fibrinolytic system indirectly and thus are believed to contribute to the occurrence of dry socket by increasing lysis

of the clot.³⁰

6) Local Circulation and Vasoconstrictors

Because dry socket is characterized by the absence of a sound clot, some authors considered that a circulation problem was an etiological factor in this condition.^{7,33} It was also postulated that the use of local anesthetics with vasoconstrictors would diminish blood supply to the wound, contributing to the clot absence.^{26,34} Other authors indicated that vasoconstrictors were of no significance.³⁵⁻³⁷ One would think that due to the thick compact bone in the posterior mandible, less blood would exist postsurgically. Surprisingly, it was shown that the blood supply is richest in the mandibular molar area where the highest incidence of dry socket is seen.³⁸

7) Fibrinolysis

Fibrinolysis is a normal physiologic process which involves the enzymatic digestion of the fibrin meshwork into smaller soluble fragments (**Fig. 1**). Plasmin is the enzyme that hydrolyses fibrin into these fragments and ultimately regulates the degree of fibrinolysis; it is the keystone to fibrinolytic activity.³⁰ As both injury and repair occur in the body, fibrin is continually being laid down and removed. It is a vital necessity in clot formation and an elevated fibrinolytic activity can be detrimental to the stability of any traumatic wound, including an extraction site.

Of all the theories of the etiology and

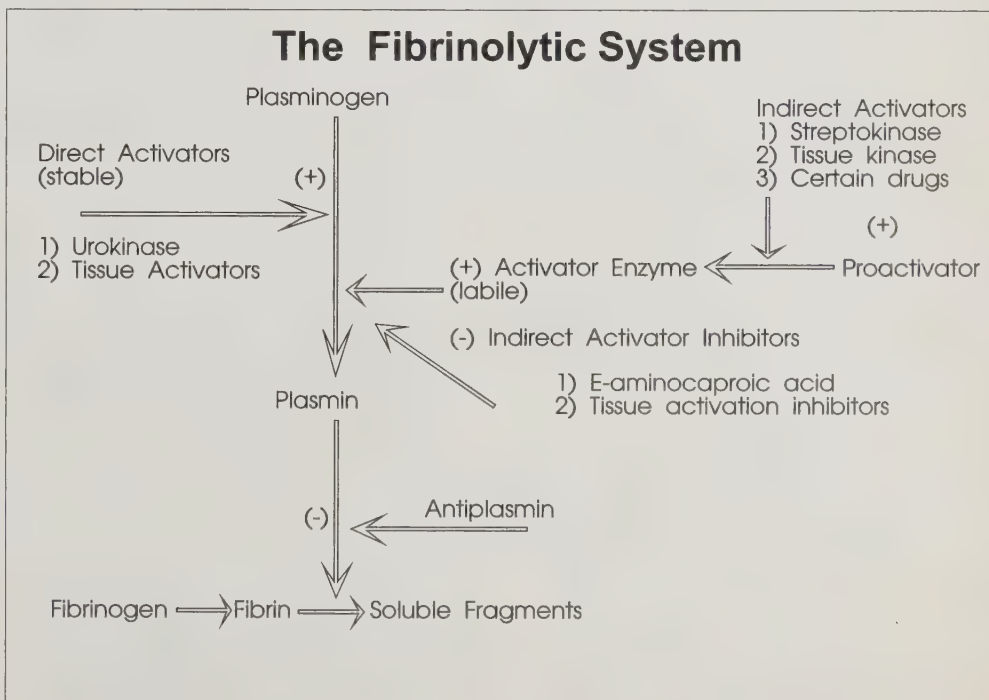


Fig 1: The Fibrinolytic System.

pathogenesis of dry socket, the most widely accepted stem from the study of the fibrinolytic system. Birn³⁹ hypothesized that an increase in fibrinolysis was responsible for dry socket pathology after noting that the fibrinolytic activity in these sockets was elevated when compared to that of normal, healing sockets. He stated that "fibrinolytic alveolitis" resulted when fibrinolysis or some other proteolytic activity within the alveolus was capable of destroying the blood clot.³⁹ Birn⁴⁰ also claimed that partial or complete lysis and destruction of the blood clot was caused by tissue kinases liberated during inflammation by a direct or indirect activation of plasminogen in the blood. Direct tissue activators are released after trauma to the alveolar bone cells converting plasminogen to plasmin which digest the fibrin clot.

Birn also demonstrated a relationship between the fibrinolysis theory and two of the cardinal signs of dry socket: pain and the necrosis of the blood clot.⁴¹ In addition, he went as far as to demonstrate the clinical effectiveness of an antifibrinolytic drug in the treatment of dry socket.⁴²

Other studies have shown that indirect activators of the fibrinolytic system have a greater role in dry socket than was originally thought.^{40,43} Early on, it was proposed that salivary contamination of the alveolar socket could lead to plasmin formation and ultimately clot lysis.⁴⁴ In addition to this belief, surgical trauma, chemical agents, systemic drugs and bacterial infection have all been proposed. In fact, there is ample evidence that bacterial pyrogens are indirect activators of fibrinolysis *in vivo*.³⁰ Some authors have shown that patients with dry socket had elevated preoperative and postoperative microbial counts and that the rate of increase in microbes was greater.⁴⁵ Patients with poor oral hygiene, and therefore an elevated microbiological flora, show an increased tendency to develop dry socket.⁴⁶ Bacteria, being natural inhabitants in the oral cavity, will constantly produce pyrogens at a basal level. It has been postulated that trauma from surgery provides increased substrate for the growth of microorganisms and they thrive and flourish on this necrotic tissue. The increased production of bacterial pyrogens stimulates fibrinolysis by promoting the conversion of proactivator to activator; the subsequent elevated plasmin level will then lyse the blood clot, resulting in dry socket.³⁰

Numerous authors have agreed that

dry socket may be caused by the presence of an infection which spreads into the alveolar bone and blood clot. Nitzan^{47,48} concluded that the microorganism *Treponema denticola* was responsible for dry socket. This anaerobic spirochete has pronounced plasma-like fibrinolytic activity and does not inhabit the mouth until late adolescence; dry socket is rarely seen in childhood. As these bacteria multiply and lyse blood clots, they do so without the usual inflammatory process criteria; the clinical symptoms of redness, swelling and pus formation are absent.⁴⁷ In fact, when injected into lab animals, they fail to produce abscesses.⁴⁹⁻⁵¹ Spirochetes, in general, are present in large numbers at sites of pericoronal infections. It is of interest to note that the extraction of teeth with pericoronitis gives rise to a substantial increase in the number of cases of dry socket.^{35,36,52} Also, a large proportion of patients with dry socket give a positive history of pericoronitis within a preoperative period of 10 days.⁴⁷

However, as stated previously, the incidence of dry socket is highest in the mandibular third molar area and especially when completely unexposed teeth are removed. Then if *Treponema denticola*, or any microorganisms for that matter, are the primary cause, then shouldn't dry socket be more common in exposed teeth with a gingival crevice and increased debris?⁵³

Prevention

Because dry socket is probably the most common post-extraction complication that exists, a successful method of prevention has long been sought. The literature reports many techniques that have been and still are being investigated for their success.

Antifibrinolytics have shown mixed results in the effort to stabilize the clot.^{4,54} Corticosteroids and their analogues have been used prophylactically for the prevention of dry socket.⁵⁵ However, although steroids may definitely decrease the immediate postoperative complications, they failed to reduce the occurrence of dry socket after extractions.⁵⁶

Studies measuring the effect of plaque control and the use of oral rinses and lavage have produced varying results. A preoperative prophylaxis in conjunction with chlorhexidine gluconate 0.2 per cent rinses decreased the incidence of dry socket.⁴⁶ A preoperative oral lavage with Chloraseptic mouth-

wash⁵⁷, in addition to irrigation around the neck of the teeth in the surgical site, was also effective.¹²

The rationale for the use of antimicrobial agents in the prevention of dry socket is that bacterial infection is the initiating factor in the pathogenesis of the condition. Proper antibiotic therapy could suppress the growth of bacteria and diminish the amount of pyrogens released; thus, the incidence of dry socket would fall. Antibiotic failures could be attributed to insufficient dosage or resistant strains of microorganisms.⁵⁷

Previous authors have found that the incidence of dry socket could be reduced by the systemic administration of antibiotics.^{24,58,59} Aiming at oral microbiota, drugs such as penicillin and scopolamine were used, both with success^{60,61} and failure,³⁶ in reducing postoperative pain after extraction. One study showed a trend toward a lower prevalence of dry socket in patients with non-acute pericoronitis who were provided with prophylactic systemic metronidazole.²⁴ Although bacteria, particularly streptococcus organisms, have been reliably associated with extraction sites,⁵⁹ they have been found to have only weak fibrinolytic activity. In general, many oral surgeons feel that the routine use of systemic antibiotics to simply reduce the incidence of dry socket, although possibly effective, is unjustified.

Multiple studies have been done to evaluate the effectiveness of topical medicaments in preventing dry socket. Sulpha drugs placed in the socket were found to aid, but also retarded healing by as many as three weeks.^{58,62,63} Polylactate cubes and granules, by providing a biologically stable support for the blood clot and for future granulation tissue, were effective in decreasing the incidence of dry socket.⁶⁴ Erythromycin cones were reported to minimize dry socket, but because this particular study did not use adequate controls, the results are inconclusive.⁶⁵ Lincomycin in Gelfoam⁶⁶ placed in the socket following removal of mandibular third molars reduced the incidence significantly;^{66,67} 9-aminoacridine, an antiseptic, was not effective.⁶⁸ Cones containing a combination of bacitracin (Nebacetin) and neomycin were tested against a placebo and found to be effective in reducing the incidence of postoperative infection and associated pain.²⁹

Numerous studies done with tetracycline preparations have proven to be effective in reducing the incidence of dry socket.^{53,67,69-71} However, one study



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demonstrated a delayed osseous healing in dogs and that large unresolved particles of tetracycline were still present in the extraction sites of the post-mortem specimens.⁷² Following its use in humans, foreign body reactions have been observed.⁷¹ Terra-Cortril,^{***} a commonly-used tetracycline-containing compound, has been implicated in the possible development of myospherulosis.⁷³ Thus, despite the clinical effectiveness that tetracycline has demonstrated in reducing the incidence of dry socket, the latter problems would cast doubts on its general use.

Only one study to date, by Trieger and Schlagel, has been done to examine the efficacy of clindamycin in preventing dry socket.^{74,75} The results strongly suggested that the etiology of dry socket is related to an infection with gram negative anaerobes and that clindamycin applied topically can be effective in its prevention.

The purpose of this study was to evaluate the clinical effectiveness of clindamycin phosphate in preventing dry socket formation after the extraction of impacted third molars.

Materials and Methods

This large prospective double-blind study included a total of 1,021 surgical sites in 270 patients (Table I). Of all the extractions, only 520 mandibular teeth were involved in the actual testing of the medicaments. As in a clinical practice environment, all patients were selected with no variables other than by having bilaterally impacted molars. The average age of the patients was 21 years. Only partial bony and fully bony impactions were considered for the study. All patients were given one of the anesthesia regimens outlined in Table II. A single operator performed all the surgeries and maintained a consistent approach. Where required, a full-thickness mucoperiosteal flap was raised and removal of bone and/or sectioning of the tooth was performed. Copious irrigation with saline was continued throughout all drilling. After assuring that the wound was ready for closure, each site in the mandible was lightly irrigated with approximately three mL of Betadine[®] and lightly suctioned to leave only trace amounts within the socket. A small square of Gelfoam soaked in clindamycin solution[™] was then carefully placed into the sockets on only one side of the mouth. In the contralateral surgical site, a square of Gelfoam soaked in saline was placed. Both

Table I:

Patient Breakdown

	Number	A) Patients on Oral Contraceptives	B) Smokers	Both A & B
Male	80	0	21	0
Female	190	127	52	41

Total Number of Patients = 270
Average age = 21 years

Table II:

Anesthesia Regimens

Anesthesia Regimen	Inhalational	Intravenous	Local
1	Nitrous Oxide	meperidine diazepam	marcaine* lidocaine**
2	Nitrous Oxide	diazepam	marcaine* lidocaine**
3	Nitrous Oxide	midazolam	marcaine* lidocaine**
4	Nitrous Oxide, Halothane, or Enflurane	thiopental sodium fentanyl succinylcholine	marcaine* lidocaine**

*0.5% with 1:200,000 epinephrine (for blocks).
**2% with 1:100,000 epinephrine (for local hemostasis).

the surgeon and patient were unaware as to which surgical site received the clindamycin. The soft tissues were then reapproximated with 3.0 gut sutures.

It should be noted that because all patients had either partial or full bony impactions requiring the surgical removal of bone, various systemic medications were also used. All patients received oral doses of penicillin VK for a period of seven days postoperatively (if allergy to penicillin existed, clindamycin was used). In addition, a single dose of a corticosteroid (methylprednisolone) was administered intramuscularly at the time of surgery. All patients were given oral diflunisal for analgesia postoperatively.

In most cases, each patient served as his or her own control to aid in data evaluation and control variability. All patients were examined seven days after surgery and the surgical sites were

evaluated for delayed or unusual healing. Any patients who developed complications were seen immediately and as necessary. The criteria for making a diagnosis of dry socket included:

1. Absence of clot in socket – was evaluated by carefully probing the socket and assessing whether or not soft tissue was present; if bone was contacted, a dry socket existed.

2. Severe symptomatic pain around surgical site within 36 hours after surgery; usually radiating up the side of the head to the ipsilateral ear, temple or neck.

3. Wound breakdown postoperatively – was assessed by visual inspection; necrotic and/or abnormal tissues generally depicted abnormal wound healing and thus dry socket.

4. Delayed healing beyond one week.

5. Relief of pain within one to two hours after placement of an anodyne

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dressings.

6. +/- malodor.

Patients who developed dry socket were treated by placement of a sedative dressing consisting of a square of Gelfoam soaked in eugenol and Balsam of Peru into the extraction site.

Results

Two-hundred seventy patients representing 1,021 extraction sites were treated in this study (Table III). Treatment with the various medicaments was done only on the mandibular extraction sites. All 520 lower third molar sockets received Betadine irrigation before closing. Two hundred sixty (50 per cent) of these sockets were treated with clindamycin in gelfoam (test group A); 260 (50 per cent) were treated with saline in gelfoam (test group B). No maxillary sockets received treatment.

Only five patients (1.85 per cent) were identified as having one dry socket. Of these patients, three were females and two were males. All occurrences of dry socket were found in the mandibular sites.

Of the diagnosed dry sockets, four (1.54 per cent) occurred in the mandibular sockets within test group B, whereas only one (0.39 per cent) occurred in test group A.

The dry socket that occurred in test group A (sockets received both Betadine and clindamycin in Gelfoam) was in a female who smoked and was currently on oral contraceptives (Table IV.) The four other cases were found in both male and female smokers. One of the males diagnosed as having dry socket was known to be HIV positive.

Discussion

The results of this study suggest that a dressing containing clindamycin, provided as a suspension in a square of gelatin sponge, and light irrigation of the socket with an antiseptic (Betadine) can significantly reduce the incidence of dry socket when used after mandibular third molar extractions. These results support similar findings reported by Treiger and Schlagel,⁷⁴ which demonstrated the efficacy of clindamycin only.

The most commonly cited etiological factors for clot lysis and development of dry socket are the presence of a tissue or bacterial activated fibrinolysin. Extraction sites are routinely contaminated with microorganisms. Those most often found are *Streptococcus viridans*, *Corynebacterium xerosis*, *Staphylococcus lactis*, *Vibrios fusobacteria*, *Bacteri-*

Table III:

Extraction Sites

	# sockets	Betadine	Test Group A Clindamycin/Gelfoam	Test Group B Saline/Gelfoam
Mandibular	520	520	260	260
Dry Sockets	0	5	1*	4
Maxillary	501	0	0	0
Dry Sockets	0	0	0	0

*patient #1

Table IV:

Patients in Which Dry Socket Developed

Patients	Test Group	Sex	# Dry Sockets	Max/Mand	Smoker	O.C.*
1	A	F	1	Mand	yes	yes
2	B	F	1	Mand	yes	no
3	B	F	1	Mand	yes	yes
4	B	M	1	Mand	yes	no
5	B	M	1	Mand	yes	no

*oral contraceptive

odes melaninogenicus, *Neisseria pharyngis* and *Staphylococcus aureus*.⁷⁶ The pattern of aerobic microorganisms found in saliva has been shown to be similar to the one that is found in extraction sites.¹⁷ But anaerobic bacteria, namely *Bacteriodes*, fusiforms and *Vibrios*, are significantly higher in numbers within the sockets than within the saliva.¹⁷ This fact verifies the authors' rationale for using a broad spectrum antibiotic aimed at gram negative anaerobes (Table V). The purpose was to reduce the level of bacterial pyrogens which are believed to be a stimulus for fibrinolytic activity. This study has also been concurrent with many previous studies in that the incidence of dry socket appears to be higher in mandibular third molar extractions, in females, in females on oral contraceptives, and in smokers.

The fact that an antibacterial (Betadine) was used as an irrigant prior to wound closure must not be overlooked. The operator had noted in his many years of clinical practice that by doing this he was able to significantly reduce

the incidence of postoperative infections, which may have also included dry socket. Although the use of this irrigant may have clouded the overall picture of the effectiveness of the clindamycin, we feel that this study demonstrates that a locally applied antibiotic is still of use in preventing dry socket.

In addition, we feel that the occurrence of dry socket can be markedly lowered by assuring a careful surgical approach and by the operator doing his or her best to perform very neat and meticulous surgery. This includes proper mucoperiosteal flap elevation, asepsis, copious irrigation when using the drill, and, before closing, adequate debridement. In addition, a clot should be allowed to form by avoiding excessive suctioning of the extraction socket. Meticulous hard and soft tissue instrumentation is of critical importance in reducing dry socket incidence.

Conclusion

The results of this study indicate that with the aid of antimicrobials, namely

Table V:

*** In Vitro Spectrum Of Activity Of Clindamycin Phosphate**

1) Aerobes	
gram +ve	gram -ve
Staphylococcus aureus	
Staphylococcus epideridis	
Streptococci, o-hemolytic	
Streptococci, non group A	
Streptococci, Beta-hemolytic	
Streptococci, groups B, C, F, G	
Streptococcus viridans	
Streptococcus milleri	
Streptococcus pneumoniae	
2) Anaerobes	
gram +ve	gram -ve
Actinomyces ssp	Bacteriodes fragilis
Eubacterium ssp	Bacteriodes ovatus
Peptococcus ssp	Bacteriodes distasonis
Peptostreptococcus ssp	Bacteriodes vulgatus
Propionibacterium acnes	Bacteriodes disiens
Microaerophilic strep.	Bacteriodes bivius
Clostridium perfringens*	Bacteriodes melaninogenicus
	Bacteriodes oralis
	Bacteriodes thetaiotaomicron
	Fusobacterium ssp

*most are susceptible but other C. species are frequently resistant to Clindamycin

clindamycin (Dalacin C Phosphate) and Betadine, the incidence of dry socket after third molar surgery can be significantly reduced. However, all patients undergoing this procedure may not be in need of this regimen. We believe that this technique should be utilized with patients presenting with greater risk for developing dry socket. Such patients may include those with a history of previous dry sockets, existing signs of pericoronitis, smokers, and female patients presently on oral contraceptives. This adjunctive mode of treatment, when used with a meticulous surgical technique, can help reduce the incidence of dry socket development in these "high risk" patients.

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Footnotes

*The Upjohn Company of Canada, Toronto.

**Norwich Eaton Pharmaceuticals, Division of Morton Norwich Products Inc., Norwich, N.Y., U.S.A.

***Pfizer Laboratories, New York.

~Betadine is 10% povidone-iodine topical solution (Purdue Frederick Inc., Toronto)

~~~Dalacin C Phosphate contains clindamycin phosphate equivalent to clindamycin base 150 mg, benzyl alcohol 9 mg, disodium ede-

tate 0.5 mg/mL of sterile solution, and water.

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## Gutta percha removal utilizing GPX instrumentation

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### ABSTRACT:

Two studies were performed in order to test the efficiency of GPX rotary instrumentation in removing gutta percha from endodontically-treated extracted teeth. A pilot project compared GPX to gates glidden instrumentation, and then a GPX technique was performed on 60 obturated mesial canals of mandibular molars. Assessment of the technique included radiographic and microscopic analysis of remaining debris. Results indicated that the GPX is a useful adjunct in these retreatment procedures. The clinical technique and time involved in the use of the GPX are discussed.

### SOMMAIRE

On a fait deux études pour déterminer l'efficacité des appareils rotatifs GPX servant à enlever la gutta-percha des dents extraites pour des traitements d'endodontie. Au cours d'un projet pilote, on a comparé ces appareils aux appareils "gates glidden," puis on a traité 60 canaux mésiaux de molaires mandibulaires suivant la technique GPX. Pour évaluer celle-ci, on a procédé à une analyse radiographique et microscopique des débris restants et on a découvert qu'elle est utile lorsqu'on traite ces dents de nouveau. De plus, on a tenu compte des techniques cliniques et du temps exigé lorsqu'on a recours à la technique GPX.

Conventional orthograde endodontic therapy is a necessary and routine procedure in the practise of dentistry. The success rate is generally very high, but there are a number of factors which may lead to eventual failure. When root canal therapy fails, three treatment options usually exist: extraction, periradicular surgery, or retreatment. The

retreatment option, where possible, is favored as the most conservative method to solve the problem.<sup>1</sup>

Retreatment involves the removal of the previous obturating material from the canal, a thorough recleaning and shaping of the root canal system, and a re-obturation of the prepared root(s).

Many different materials have been used to obturate root canals, but the primary obturating material in North America has been gutta percha, along with a zinc oxide-eugenol based sealer.<sup>2</sup> Fortunately, there are a number of ways in which these materials can be removed from the canals. Techniques previously discussed in the literature include the use of rotary instruments<sup>2,3</sup> (gates-glidden and/or peeso burs), heat carrying instruments<sup>4</sup> (flame heated or electrical), and solvents<sup>5,6</sup> (chloroform, eucalyptol, xylene). In addition, combinations of these techniques in conjunction with routine hand filing have been reported.<sup>2,3,6</sup>

Recently, a new rotary instrument was introduced to the dental marketplace to facilitate the removal of gutta percha. This instrument, the GPX (Brassler, U.S.A., Inc., Savannah, Georgia) is a latch type instrument for use on low-speed handpieces (Fig. 1). The GPX features a spiralled vent through which gutta percha is extruded as it is plasticized from frictional heat. The instruments are sized to conform to the same

diameter and taper as conventional endodontic files. The effective working length of the GPX is 21 millimetres. To the author's knowledge, no evaluation of this instrument has been reported in the literature. Therefore, it was decided to undertake two studies to evaluate the efficacy of the GPX instrument in removing gutta percha from previously obturated root canals.

### Part 1 - Pilot Study Materials and Methods

The first experiment was designed to compare the GPX technique to a more conventional combination technique for gutta percha and sealer removal in anterior teeth.

Sixteen extracted maxillary anterior teeth with single straight roots were obtained and stored in water. The crowns were removed two mm coronal to the cemento-enamel junction and direct line access openings were made using a number 170 high-speed bur. A size 10 K file was placed into the canal until it was visible at the apical foramen and the working length was established one mm short of this length. Canals were cleaned and shaped using conventional hand filing to a master apical file of size 60. Three step backs at one mm increments and gates-glidden (size 3 and 4) rotary instrumentation in the middle and coronal portions of the canal

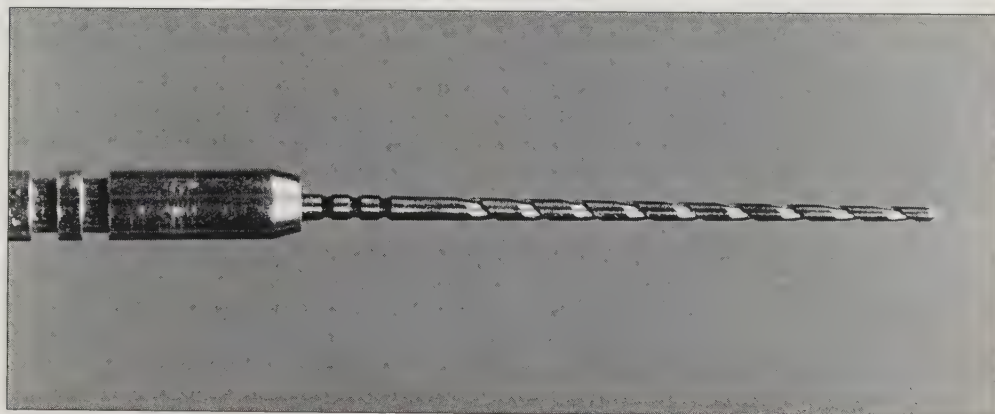


Fig. 1: GPX instrument (for use in slow speed contra-angle).



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were used to flare the canal. A 2.5 per cent sodium hypochlorite irrigation was used throughout the cleaning and shaping process. The canals were dried with paper points, a zinc-oxide eugenol based sealer (Tubliseal, Kerr) was applied to the canal wall and master point, and the canals obturated with gutta percha employing a standard lateral condensation technique. The teeth were radiographed and the obturations deemed satisfactory based on radiographic criteria of correct length and a homogeneous radiopaque fill.

The obturated teeth were divided into two groups of eight and the removal of the obturating material was accomplished via one of the following techniques:

Group A – gates glidden burs (size 3 and 4) were used to remove gutta percha to within approximately five mm of the working length. The canal was then flooded with chloroform to soften the gutta percha, which was then removed with size 30 and 60 K files until no additional gutta percha was present on the files.

Group B – A GPX instrument, size 50, was used to remove gutta percha to the working length of the tooth. The GPX is rotated clockwise in a slow-speed hand-piece and light pressure is applied to the gutta percha. When the gutta percha softens the instrument is gently guided by hand pressure down the canal. As the instrument moves apically, the gutta percha is extruded coronally. Once working length is achieved, an up-and-down motion of the GPX can be used to facilitate further gutta percha removal. Following the use of the GPX, the canal was rinsed with chloroform.

The time required to remove gutta percha from the canal using method A or B was determined and recorded. The teeth were radiographed and numbered following gutta percha removal. Then the teeth were mounted and sectioned longitudinally using a diamond wheel. The buccal and lingual tooth sections were glued to slides with an epoxy resin and examined under the stereodissecting microscope at 16X magnification. Each canal was divided into apical, middle, and coronal thirds and assessed for the remaining gutta percha and sealer. The evaluation of remaining debris was based on a scale of 0 to 3 as follows:

- 0 – no traces evident
- 1 – mild traces evident
- 2 – moderate traces evident
- 3 – severe traces evident.

Each canal was assessed independently by two operators and the re-

**TABLE I:**

### Average Amounts of Gutta Percha and Sealer Remaining in Canals

| Anterior Teeth with Single Canals |                                                                              |        |              |        |
|-----------------------------------|------------------------------------------------------------------------------|--------|--------------|--------|
|                                   | Gates Glidden                                                                |        | GPX          |        |
| Area                              | Gutta Percha                                                                 | Sealer | Gutta Percha | Sealer |
| Coronal 1/3                       | 0.37                                                                         | 0.63   | 0.0          | 1.75   |
| Middle 1/3                        | 1.0                                                                          | 0.87   | 0.13         | 2.5    |
| Apical 1/3                        | 2.0                                                                          | 1.6    | 1.13         | 1.75   |
| Scale                             | 0 = no traces<br>1 = mild traces<br>2 = moderate traces<br>3 = severe traces |        |              |        |

**TABLE II:**

### Average Amounts of Gutta Percha and Sealer Remaining in Canals

| Molar Teeth: Mesio-Buccal and Mesio-Lingual Canals |                                                                             |      |        |      |
|----------------------------------------------------|-----------------------------------------------------------------------------|------|--------|------|
|                                                    | GPX                                                                         |      |        |      |
| Area                                               | Gutta Percha                                                                |      | Sealer |      |
|                                                    | MB                                                                          | ML   | MB     | ML   |
| Coronal 1/3                                        | 0.0                                                                         | 0.0  | 1.0    | 0.92 |
| Middle 1/3                                         | 0.05                                                                        | 0.17 | 1.47   | 1.32 |
| Apical 1/3                                         | 1.7                                                                         | 0.92 | 2.3    | 1.97 |
| Scale                                              | 0 = no trace<br>1 = mild traces<br>2 = moderate traces<br>3 = severe traces |      |        |      |

sults tabulated.

#### Results

All the canals examined had some debris, either gutta percha or sealer. The average amounts of gutta percha and sealer remaining in the canals are presented in Table I. The gates-glidden technique (method A) had more gutta percha remaining throughout the canal, especially in the apical and middle one-third than the GPX technique (method B). However, the gates-glidden method was more effective in removing sealer

from the canal walls.

There was a wide variation in the time necessary to remove the gutta percha. The average time using the GPX technique was 37 seconds, compared to an average of five minutes 34 seconds for the gates-glidden method.

#### Part II – GPX Technique in Molars

The pilot study revealed the potential benefit of the GPX instrument in straight canals and relative to a com-



TABLE III:

### Number of Teeth (Average) with Gutta Percha and/or Sealer Remaining in Canals

| Molar Teeth: Mesio-Buccal and Mesio-Lingual Canals |              |         |         |        |
|----------------------------------------------------|--------------|---------|---------|--------|
| Area                                               | GPX          |         |         |        |
|                                                    | Gutta Percha |         | Sealer  |        |
|                                                    | MB           | ML      | MB      | ML     |
| Coronal 1/3                                        | 0/30         | 1/30    | 4.5/30  | 2.5/30 |
| Middle 1/3                                         | 1/30         | 3/30    | 11.5/30 | 9.5/30 |
| Apical 1/3 1                                       | 9/30         | 12.5/30 | 25/30   | 21/30  |

monly used technique. Thus, a second experiment was undertaken to further explore the efficiency and use of this instrument in canals that were smaller and more curved. Also, the technique was altered slightly to try to enhance the removal of sealer from the canal wall.

#### Materials and Methods

Thirty-three mandibular molars were selected and stored in saline throughout the experiment. Access openings were prepared and the mesio-buccal and mesio-lingual canals of each tooth were prepared using a standardized step-back technique as described in experiment one. Due to canal size and curvature, each canal was prepared to a minimum master apical file of size 35 (the largest was size 50). After canal preparation, the canals were dried and obturated with a zinc oxide-eugenol sealer (Tubliseal) and gutta percha using a lateral condensation technique. Radiographs were taken to determine obturation suitability. Three teeth were rejected, leaving a sample size of 30 teeth with a total of 60 canals.

The gutta percha and sealer obturation were removed as follows: A GPX instrument that matched the size of the master apical file was selected and used in each canal to the previously recorded working length (where possible). The time to remove the gutta percha was recorded. The canal was then flooded with chloroform and a K file that matched the size of the master apical file was used in an up-and-down motion to working length for 30 seconds. The canals were rinsed with five cc of 2.5 per cent sodium hypochlorite and the teeth stored in saline. Radiographs were taken to confirm gutta percha removal

and for a radiographic assessment of cleanliness.

In 10 teeth, the working length was longer than the maximum extension of the GPX instrument (20 mm from actual head of handpiece). After initial radiographs, it was decided to reduce the

crowns of these teeth to allow full penetration to working length. A GPX instrument two sizes smaller than the master apical file was selected and used to the true working length for 30 seconds. A rinse with chloroform followed this, but with no additional filing. The teeth were stored in saline.

The mesial root of each tooth was sectioned from the remaining tooth at the cemento-enamel junction and through the furcation using a 170L high-speed bur. Grooves, approximately one mm deep, were placed with the 170L bur along the buccal and lingual sides of each root. A mallet and chisel were used to fracture the root along its long axis. The sectioned pieces were measured and marked into coronal, middle, and apical thirds and glued by epoxy resin to glass slides. The two sides of each canal (MB and ML) were viewed under the stereo-microscope at 16X magnification and the remaining gutta percha and sealer assessed by two persons independently according to the scale previously described.



Fig. 2: Experimental sequence, tooth 1; i) pre-operative (bucco-lingual radiograph); ii) mesial canals obturated (bucco-lingual radiograph); iii) after GPX (mesio-distal radiograph).

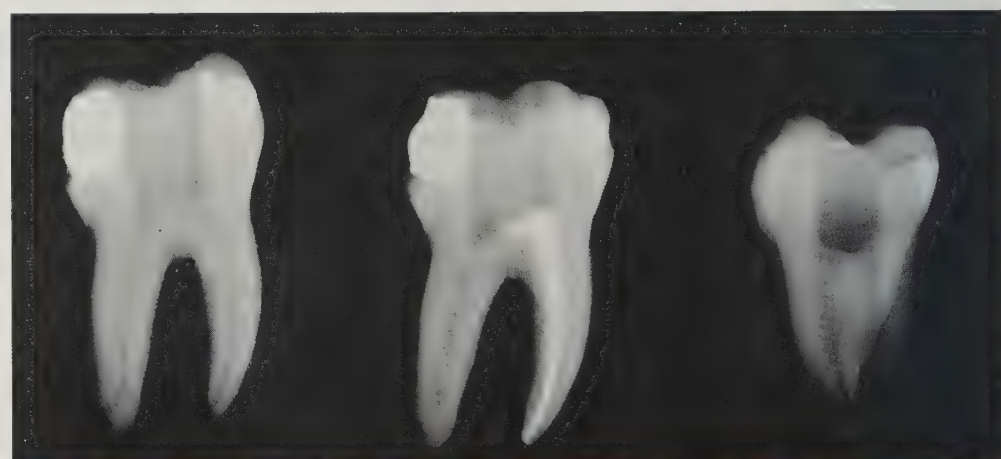
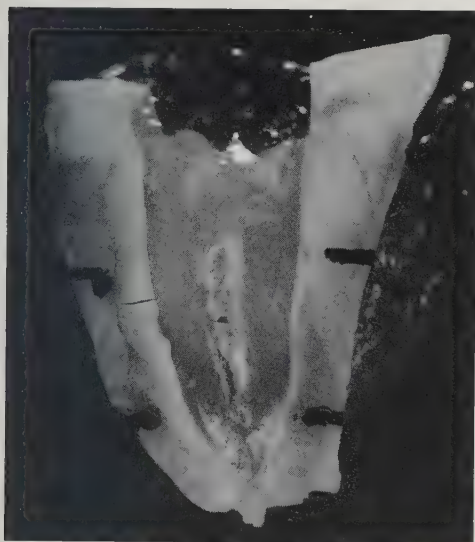


Fig. 3: Experimental sequence, tooth 2; i) pre-operative (bucco-lingual radiograph); ii) mesial canals obturated (bucco-lingual radiograph); iii) after GPX (mesio-distal radiograph).





**Fig. 4:** Sectioned mesial root mounted for viewing.



**Fig. 5:** 8X magnification of Fig. 4 mesial root (buccal canal on left, lingual on right).



**Fig. 6:** 8X magnification of Fig. 4 mesial root (buccal canal on right, lingual on left).

## Results

All the canals examined had some debris: gutta percha and/or sealer. The average amounts of gutta percha and sealer remaining in the canals are presented in **Table II**. A distinct pattern was seen in that the canal contained increasingly more debris from coronal to apical. The GPX was very effective in removing gutta percha from the middle and coronal thirds but not as effective in the apical one third. Sealer was seen more prominently than gutta percha at every level. The 10 teeth given a "second" chance at achieving apical depth showed slightly better results than the other canals. The average number of teeth containing obturation remnants and at what level are shown in **Table III**.

After this technique, the canals appeared radiographically clean. **Figs. 2** and **3** represent typical examples after GPX removal of the obturating material. **Fig. 4** reveals the sectioned mesial root, divided into coronal, middle, and apical

thirds for examination under the stereomicroscope. **Figs. 5** and **6** are 8X magnifications of the root sections shown in **Fig. 4**.

In this example, the gutta percha has been effectively removed by the GPX but there are still plaques of sealer remaining on the dentin walls, particularly in the apical segment.

The original time taken to perform this procedure averaged 45.5 seconds for the MB canal and 45.4 seconds for the ML canals. Since 10 teeth were treated for an additional 30 seconds per canal, the averages became 55.5 seconds for the MB canal and 55.4 seconds for the ML canal.

During treatment, two of the GPX fractured and remained in the canal. Both of these were size 35 instruments. One instrument was so loose in the canal that it floated out with the chloroform rinse; the other instrument was lodged more firmly and was left in the canal (apical one-third).

## Discussion

The GPX, to the author's knowledge, is the first commercially available instrument that has been designed specifically for the removal of gutta percha to the apical end of endodontically treated teeth. This study focused on the ability and efficiency of the GPX alone in removing gutta percha. As such, the experimental design did not allow for an accurate (statistical analysis) comparison to another method(s) currently used in gutta percha removal. Further research incorporating this type of control would be useful and is planned.

Rotary instruments such as gates glidden burs and peeso reamers, used previously in gutta percha removal, are not to enter the apical third of the canal due to their size, lack of flexibility, and potential for breakage. This is particularly true of curved canals. The GPX comes in small sizes and is quite flexible, allowing apical penetration. In our experiments, of the 68 canals done with the GPX, two instruments fractured. This may have been due to the fact that the instruments were used many times. (Size 35 matched the master apical file most often and therefore was selected most often. The exact number of times a specific instrument was used was not recorded).

The possibility of instrument breakage is a major concern and will require further testing. Clinically, the primary author has seen two cases of instrument separation without retrieval. The advisability of using this type of instrument in the apical few millimetres of canals, especially curved canals, requires serious consideration and further experimentation.

Radiographic assessment of canal cleanliness appears to be unreliable. This is a concern since it is the most clinically feasible method. Radiographic assessment following GPX instrumentation alone, or after GPX and a chloroform rinse, appeared to show a clean canal with some exception in the apical tips of the canals. The microscopic analysis revealed that these canals still contained a significant amount of debris. This debris apparently is not sufficient to appear radiopaque on the radiographic films. This may be due to insufficient debris or the technique employed in radiographing the specimens.

The GPX was particularly effective in the coronal and middle thirds, but gutta percha in varying quantities was still often seen in the apical third. The situation was quite similar for sealer, al-



though sealer scores were generally higher than for gutta percha and sealer was mainly apparent extending into the middle third of a number of canals. Clinically, this would mean that one would have to use a solvent and hand filing for more than the 30 seconds used in this experiment to effectively clean out the remaining remnants. Although chloroform was the solvent used in this project, one should note that its use for this purpose has recently been questioned. The fact that chloroform is known to be cytotoxic<sup>7</sup> and some evidence exists that it may have carcinogenic potential<sup>8</sup> may lead one to consider an alternate solvent or technique such as heated eucalyptol.<sup>6</sup> Certainly, cleaning and shaping must play a prominent role in retreatment if the case is to be successful, since all the canal walls require attention beyond obturation material removal.

The GPX instrument appears to remove gutta percha very efficiently. The gutta percha is plasticized quickly and when canal penetration is performed, the gutta percha is ejected out the coronal orifice of the canal. At times, this ejection appears to remove the gutta percha "en masse." This efficacy is particularly impressive in that the canals had been obturated under ideal conditions and were densely filled. Clinically, it is known that many failing cases are due to the inadequacy of the obturation.<sup>9</sup> In these less well filled canals, the GPX is likely to be even more efficient and safe. The major problem encountered was that the instruments have an effective working length of 20 mm when placed in the slow speed contra-angle handpiece. At times, this length was not sufficient to achieve working length. In the experiment, 10 teeth were reduced to allow this penetration to working length; clinically, this would probably not be possible.

## Conclusions

1. The GPX instrument is efficient and effective in removing gutta percha from root canals.

2. The technique employed left some debris (gutta percha or sealer or both) in all canals. This debris was most prominent in the apical third of the canal and was usually not radiographically detectable.

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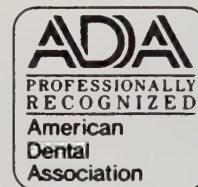


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## Fatal necrotizing fasciitis of dental origin

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### ABSTRACT

*Necrotizing fasciitis is a potentially fatal, acute bacterial infection characterized by extensive fascial and subcutaneous tissue necrosis. Four factors that contribute significantly to the morbidity and mortality of necrotizing fasciitis are: 1) delayed treatment, due to difficulty in recognizing the condition; 2) inappropriate treatment; 3) host debilitation; and 4) a polymicrobial infection.*

### SOMMAIRE

*Maladie qui peut être fatale, la fasciite nécrosante ou gangreneuse se caractérise par une inflammation bactérienne aiguë des tissus aponévrotiques et sous-cutanés. Les quatre facteurs qui peuvent rendre cette maladie morbide ou mortelle sont: 1) le retard apporté à la traiter à cause de la difficulté à l'identifier; 2) un traitement inadéquat, 3) la débilité du sujet, 4) une infection polymicrobienne.*

**N**ecrotizing fasciitis is an acute bacterial infection characterized by extensive fascial and subcutaneous tissue necrosis. If not diagnosed and appropriately treated, skin, muscles and vascular structures rapidly become involved with an associated degree of morbidity and mortality. Although the term necrotizing fasciitis was first suggested by Wilson<sup>1</sup> in 1952, it was Jones<sup>2</sup> in 1871 who first described the basic disease process as "hospital gangrene." Synonyms previously used include hemolytic streptococcal gangrene, bacterial synergistic gangrene, gangrenous erysipelas, Fournier's gangrene, necrotizing erysipelas, synergistic necrotizing cellulitis, and suppurative fasciitis. Regardless of the name, all authors report a fulminant disease process, initially causing characteristic subcutaneous necrosis with widespread su-

perficial tissue undermining and varying degrees of systemic toxicity.

Necrotizing fasciitis is most commonly seen in adults, involving the extremities, perineum, abdomen or chest wall, and is well documented in the general surgery literature. By comparison, the head and neck are only rarely affected. Crowson,<sup>3</sup> in 1973, was the first to report a fatal case of necrotizing fasciitis following the extraction of a mandibular right first molar. Balcerak and colleagues<sup>4</sup> reviewed 24 cases of necrotizing fasciitis of the head and neck, of which only six were of dental origin. Five of these patients survived and one died, that being the same case reported by Crowson. Moss and colleagues<sup>5</sup> recently reported a non-fatal case of necrotizing fasciitis as a sequela to the extraction of mandibular left first and second molars, thus contributing a seventh case. The following case is believed to be the second reported fatal case of necrotizing fasciitis of dental origin.

### Case Report

A 37-year-old alcoholic and diabetic female presented to a local hospital with a four-day history of a toothache in the posterior lower right quadrant, right submandibular swelling, and difficulty swallowing. She was afebrile. A diagnosis of a right submandibular abscess of dental origin was made, and the patient discharged with a prescription for Ampicillin 250 mg, four times a day, for seven days. Three days following initial presentation, the patient presented again with a bilateral submandibular cellulitis, trismus and a sore chest. Her white blood cell count (WBC) was  $10.9 \times 10^9/L$  (with a shift to the left), temperature  $37.6^\circ C$  and her blood pressure was 90/60. She was admitted to hospital with a diagnosis of Ludwig's angina and started on penicillin G, one million units intravenously every four hours, and Flagyl, 500 mg intravenously every eight hours. On the second day of admission, a pericardial friction rub and

left chest crepitations were detected. The patient's condition deteriorated markedly over the next 48 hours. She developed bilateral pleural effusions, pulmonary edema and deteriorating blood gases. Shortly afterwards she lost consciousness and demonstrated signs of airway compromise. A bronchoscopic intubation was performed, followed by tracheostomy. Incision and drainage, in the right anterior triangle of the neck, produced a large amount of foul smelling pus. The antibiotic regimen was changed to one gram of Ancef, every six hours, and Gentamycin, 60 mg every eight hours intravenously. Forty-eight hours following incision and drainage, her temperature had dropped and her respiratory status appeared to be improving, but still required mechanical ventilation. She continued to remain comatose and extremely agitated, requiring sedation. Aspirate culture demonstrated 4+ B *Hemolytic Streptococci*; 3+ *Bacteriodes melaninogenicus*; 3+ anaerobic gram negative organisms (not B fragilis); and 3+ anaerobic nonspore bearing gram positive rods. An infectious disease consultant changed the intravenous antibiotic regimen to Clindamycin 600 mg every six hours; Penicillin G, two million units every six hours; and Cefotaxime, one gram every six hours. On the 10th day following admission, the patient was transferred to our tertiary care hospital for CT scanning and further surgical debridement.

The patient was admitted with a diagnosis of necrotizing fasciitis of the neck and septic shock. Her vital signs were: blood pressure 100/50; pulse 150 beats per minute; temperature  $40^\circ C$ ; respiration 20. Her pulmonary capillary wedge pressure was elevated and cardiac output decreased, requiring inotropic support. She was comatose and unresponsive to pain. The most striking finding was a six centimetre defect in the right submandibular region in the neck (Fig. 1). The neck muscles were clearly visible, as was a pulsatile carotid artery. The soft tissues appeared necrotic and an odor charac-



teristic of anaerobic bacteria was present. Her WBC was  $17.3 \times 10^9/L$  (with a shift to the left) and blood glucose was 16.9 millimoles/L. Her arterial blood gases demonstrated a metabolic acidosis. Bilateral pleural effusions and air in the left subcutaneous tissues of the neck were demonstrated on CT scans.

The patient was taken to the operating room the same day where, with general anesthesia, she underwent (Fig. 2):

- 1) resection of both necrotic sternocleidomastoid muscles;
- 2) resection of both necrotic submandibular glands;
- 3) resection of an occluded right internal jugular vein;
- 4) drainage of both left and right empyemas and placement of chest tubes;

5) a right anterior mediastinotomy and tube placement;

6) extraction of carious teeth numbers 34, 35, 45, 46 and 47.

There was free communication between the neck and anterior mediastinum. Skin was not excised and the flaps were replaced, although their viability was suspect. The patient was returned to an intensive care unit.

Four days following debridement of the neck, the septic hemodynamics had improved. *Staphylococcus aureus* and *Candida albicans* were identified from the fluids drained from the neck and pleura and, therefore, Cloxacillin was added to the regimen with Flagyl being substituted for Clindamycin. On the eighth postoperative day, the neck was skin grafted with a split thickness skin graft obtained from the patient's right calf (Fig. 3). She continued to improve and required less insulin to control her hyperglycemia. One week following skin grafting, she once again became febrile and developed a cellulitis in the groin of her left leg. Despite the institution of a vancomycin regimen, the cellulitis progressed to become a septic left hip. Elevated temperatures persisted and on the 30th day post-debridement, she developed abdominal distention and cellulitis of her left forearm, which required surgical excision of the left cephalic vein. Subsequent renal failure, liver failure, a pulmonary embolus and an enteromediastinal fistula led to the decision to stop aggressive management, and the patient died 44 days following admission.

## Discussion

Over 120 years ago, Jones<sup>2</sup> reported



Fig. 1. Neck on admission.



Fig. 2. b) Debrided neck.



Fig. 2. a) Debrided neck.



Fig. 3. Neck 10 days post skin grafting.

a 46 per cent mortality rate associated with necrotizing fasciitis. Between 1920 and 1940, 21 cases were reported in the general surgery literature, with a 40 per cent mortality rate.<sup>6</sup> Rouse et al,<sup>7</sup> in 1982, reported a mortality rate of 73 per cent, whereas Freischlag and colleagues<sup>8</sup> reported a mortality rate of 52 per cent in 1985. Even though major advances have been made in acute infection treatment, necrotizing fasciitis continues to have a high mortality rate. Gurman<sup>9</sup> identified four factors that contribute significantly to the morbidity and mortality of necrotizing fasciitis, all of which are demonstrated in our case report.

The first factor is a delay in starting treatment, usually due to difficulty in recognizing the condition.<sup>9</sup> The infective process usually begins two to four days after an initial insult such as a dental infection, peritonsillar abscess, laceration, abrasion, burn, penetrating

trauma, surgery or dental extraction.<sup>4</sup> The disease process presents with a deceptively benign superficial appearance, often mistaken for a soft tissue infection such as cellulitis or erysipelas.<sup>10</sup> Initially, the skin becomes inflamed, smooth, tense and shiny, with no sharp demarcation between normal and affected skin. Infection spreads in the subcutaneous tissue and along deep fascial planes with relatively little destruction of skin. This obscures the diagnosis of the underlying condition. As the disease progresses, the overlying skin undergoes a dusky discoloration, appearing as a small purplish-blue patch with irregular and ill-defined borders. This is a characteristic sign for necrotizing fasciitis. Blisters or bullae will appear in the affected area, with the underlying skin becoming necrotic. The localized skin necrosis is believed to be secondary to nutrient vessel thrombosis as they pass through the involved fas-



cia.<sup>11</sup> Thus, superficial skin necrosis is a late sign.

Systemic effects may also be seen and include prostration, tachycardia, fever, anemia, leukocytosis and crepitus in the soft tissues. The absence of crepitus does not rule out gas formation, since gas can accumulate in areas inaccessible to direct palpation.<sup>5</sup> Soft-tissue radiography or computed tomography (CT) can be useful in detecting gas, thereby facilitating an early diagnosis. Preoperative identification of specific areas into which infection can spread allows for complete and thorough drainage and debridement. C.T. scanning aids in identifying the spread of infection within vascular sheaths and extension to remote areas, as well as the presence of vascular thrombosis, or erosion of vessels, prior to surgery.

Stamenkovic and Lew,<sup>12</sup> based on a retrospective study of 19 cases over a 13-year period, recommended the use of frozen-section biopsies to facilitate early clinical diagnosis. They established the following histopathologic diagnostic criteria for necrotizing fasciitis: a) necrosis of superficial fascia; b) polymorphonuclear infiltration of the deep dermis and fascia; c) fibrinous thrombi of arteries and veins passing through fascia; d) angitis with fibrinoid necrosis of arterial and venous walls; e) presence of microorganisms within destroyed fascia and dermis in a tissue specimen with Gram's stain; and f) an absence of muscle involvement.

The second factor identified by Gurman is the treatment itself.<sup>9</sup> Early intervention, large surgical excision, appropriate antibiotic therapy and supportive measures are the keys to successful treatment.

The source of infection should be identified and managed immediately. A complete bacteriologic evaluation is required, including Gram's stain, aerobic and anaerobic cultures of purulent material. Special efforts should be made to ensure anaerobic techniques. Appropriate transport of culture specimens and the proper media for aerobic and anaerobic culture are essential.<sup>5</sup>

Intravenous antibiotics which are effective against the common infecting organisms should be instituted. High doses of penicillin is one regimen, pending results of culture and sensitivity tests.<sup>13</sup> Klabach et al<sup>10</sup> have recommended an aminoglycoside in combination with ampicillin as antibiotics of first choice. Clindamycin, chloramphenicol, and metronidazole are all recommended antibiotics.<sup>14</sup>

Early radical debridement and drainage of all involved tissues remains the most important therapeutic intervention. Subcutaneous tissue is usually edematous and may ooze a thin grey serosanguinous "dish water" exudate, which may or may not be foul smelling.<sup>4</sup> Fasciotomy must be performed to the full extent of the lesion. Actual fascial involvement is always much more extensive than that of the overlying skin. Multiple incisions are required and repeated debridements may be necessary. Early fasciotomy leads to decreased loss of skin. Skin grafting or primary closure of open wounds may be needed after the condition resolves to avoid scar contracture. A variety of dressings have been recommended. They are usually gauze packs saturated with normal saline, hydrogen peroxide, zinc peroxide, zinc oxide, Dakin's solution, 0.5 per cent silver nitrate, or antibiotics.<sup>4</sup> As in our case, muscle involvement is secondary to long-standing untreated infection.

Supportive therapy may include airway management, mechanical ventilation, nutrition, fluid and electrolyte replacement, transfusion of appropriate blood components and control of systemic diseases. Hypocalcemia is commonly seen, due to calcium loss through necrotic fat saponification.<sup>5</sup> This was not observed in our case.

The use of hyperbaric oxygen in the management of necrotizing fasciitis is controversial. Freeman et al<sup>5</sup> reported that hyperbaric oxygen is not useful, while Krespi and colleagues<sup>16</sup> and Wilkerson and colleagues<sup>17</sup> advised its use as part of the daily management of necrotizing fasciitis. Further research is required to determine the benefits of hyperbaric oxygen therapy in the management of anaerobic infections. Hyperbaric oxygen facilities are not locally available and were not used in our case.

Host debilitation is the third factor that contributes to the morbidity and mortality of necrotizing fasciitis. Diabetes, arteriosclerosis, peripheral vascular disease, alcoholism, cirrhosis, malnutrition, steroid therapy, radiotherapy, hypertension, old age or obesity appear to be predisposing factors and are found in the histories of reported cases.<sup>9</sup> Alcoholism and diabetes were predisposing factors in our fatal case.

The fourth factor making necrotizing fasciitis a dangerous entity may be the combination of pathogenic organisms.<sup>9</sup> Most reported cases suggest a polymicrobial aerobic-anaerobic infection. The more common anaerobic organisms isolated in necrotizing fasciitis of the head

and neck include *Peptostreptococcus*, *Bacteriodes melaninogenicus*, *Fusobacteria* and *Clostridium*, all reflecting the oral flora.<sup>5</sup> This bacteriological picture calls for an early combination of antibiotics to cover all the possible pathogenic flora. Partial coverage encourages microbial overgrowth and renders the clinical evolution unpredictable and sometimes dangerous.

Many strains of *Bacteriodes* are found to be penicillin-resistant secondary to the elaboration of B-lactamase. Gas producing wound infections are generally produced by *Clostridial* bacteria, although non-clostridial infections have been reported to produce gas in the neck, as in our case.<sup>18</sup>

Our case demonstrates all four factors identified by Gurman. A debilitated patient with a polymicrobial infection in which there was a delay in identifying necrotizing fasciitis and initiating appropriate treatment. In spite of modern antibiotic intervention, extensive surgery and intensive care, the patient died of renal failure and septic shock.

Although rare, necrotizing fasciitis is a potentially life-threatening infectious process that may arise in the head and neck area, secondary to dental infections. Airway obstruction, arterial erosion, jugular vein thrombophlebitis, mediastinitis, aspiration pneumonia, septic shock and lung abscesses, are all potential complications of necrotizing fasciitis.<sup>5</sup> The clinician who deals with dental infections, especially in debilitated patients with compromised immune functions, should consider a diagnosis of necrotizing fasciitis to prevent these fatal complications.

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**LETTERS.....**(cont'd from page 17)

nance consisted merely of a "prophy" every six months. Her orthodontic treatment commenced in the 1960s (when there was very little adult orthodontics being carried out), and was executed in the same manner as would be done for children. I can assure Dr. Stephens that, with the exception of the upper right second molar, there was only a moderate degree of attachment loss initially throughout this mouth, and that the rarefaction shown in Fig. 1b was not present before treatment. This radiograph (Fig. 1b) was taken approximately midway through treatment. Perhaps, therefore, I should not have used the word early in the caption. The word early was used merely to distinguish this radiograph from the one shown in Fig. 1c – which was taken in the final stages of treatment. The prognosis for the first molar was good, and this tooth should not have been lost with proper

inflammatory and occlusal control. That was my point.

Secondly, I fully agree with Dr. Stephens's comment that extreme care should be observed in patient selection. Furthermore, very detailed periodontal evaluation by a qualified periodontist must be undertaken prior to commencing orthodontic treatment for the adult periodontal patient. Considerable time should be spent in treatment planning these cases (with the periodontal charting at hand), and in presenting the treatment plan or plans to the patient (and, if possible, to the patient's spouse), including the prognosis for individual teeth and for the case as a whole. Before commencing the orthodontic treatment, the patient must have similar discussions with the periodontist, the restorative dentist and the other professionals involved in his case so that he may become fully informed of all aspects of the multidisciplinary treatment, including all of the costs associ-

ated with it. In other words, a total commitment in advance to *all* aspects of treatment is absolutely essential. Otherwise the orthodontic treatment may be for naught. This was the intent of my statement that "a total financial commitment on the part of the patient is absolutely essential." Unfortunately, in my desire to be as brief as possible, this statement may not have come across as intended – for which I apologize. Let me further assure Dr. Stephens that I am certainly in full agreement with the CDA Patients' Charter of Rights, including item 2.

Finally, I wish to emphasize that the three case presentations which have been submitted to the *Journal* form an integral part of my article, and should help to illustrate my philosophy and my method of *controlled* orthodontic treatment for the adult patient.

*Harvey L. Levitt, DDS, FRCD(C), FICD, FACD*

*Montreal, Qc*

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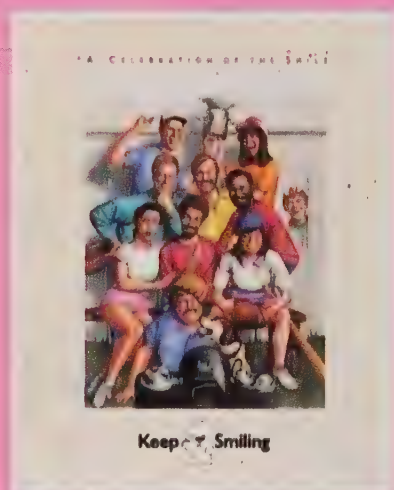
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**BRITISH COLUMBIA - Vancouver Island-Comox Valley:** Very busy family practice — five operatories, 1,400 sq. ft. Practice is located in a rapidly-growing community. Area offers excellent recreation opportunities. For more information, call (604) 338-0480. (9/01)

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**BRITISH COLUMBIA - Lillooet:** Full time associate required for busy general, family oriented practice. Located in sunny Lillooet on Fraser River, northeast of Vancouver. Reply to: Dr. Barry Goldberg, P.O. Box 188, Lillooet, B.C. V0K 1V0. Res: (604) 256-7162, Office: (604) 256-4616. (12/01)

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Send application including a curriculum vitae and the name of three references to:

**Dr.G.W. Thompson, Chairman,  
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Send curriculum vitae and the names of three references to:

**Dr. K.E. Glover  
Chair, Department of Stomatology  
University of Alberta  
Edmonton, Alberta T6G 2N8**

Deadline for applications is February 29, 1992.

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(12/01)

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WINTER CURLING BONSPIEL**  
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# Announcements

## NATIONAL HIGHLIGHTS

**January 24-25, 1992**  
**Manitoba Dental Association**  
(204) 453-0055

**March 21-25, 1992**  
**Association of Prosthodontists of Canada  
and the Canadian Association of  
Oral & Maxillofacial Surgeons**  
**Banff, Alberta**

Dr. Lawrence St. Pierre (705) 737-0607  
Dr. Brian Kucey (403) 468-7270

**March 26-28, 1992**  
**B.C. Dental Meeting**  
**Vancouver Trade & Convention Centre**  
**Vancouver, British Columbia**  
(604) 736-3645

**May 3-7, 1992**  
**Les journées dentaires**  
(514) 875-8511

**May 14-16, 1992**  
**ODA Spring Meeting**  
(416) 922-3900

**May 30, 1992**  
**New Brunswick Dental Society**  
(506) 452-8575

**June 18-20, 1992**  
**Newfoundland Dental Association**  
(709) 579-2362

**August 29-September 2**  
**1992 Canadian Dental Association  
Annual Convention**  
**Calgary, Alberta**  
Janice Edgar (613) 523-1770  
(outside Canada)  
1-800-267-6364 (East) or  
1-800-267-6354 (West)

**February 22-29: Virgin Islands Dental Association Convention.** For convention pre-registration (limited), travel and accommodation at group fares, please contact: Lynne Brandon CDA, 85 Lonsdale Dr., London, Ont N6G 1T4. Tel: (519) 657-4306 (evenings).

## March/Mars 1992

**March 8-12: The 15th Asian Pacific Dental Congress** in Auckland, New Zealand. For registration forms, contact: New Zealand Dental Association, PO Box 28 084, Remuera, Auckland, New Zealand.

**March 26-28: World Congress XII for Oral Implantology** in Sydney, Australia. For details, contact: Margaret M. Jackson, Executive Director, The International Congress of Oral Implantologists, 248 Lorraine Ave, Upper Montclair, NJ 07043, USA. Tel: (201) 783-6300. Fax: (201) 783-1175.

**March 27: George C. Hare Lectureship: Dr. James L. Gutmann on "Parameters of Clinical Success in Endodontic Treatment and Retreatment"** at the University of Toronto. For more details, contact: University of Toronto, Faculty of Dentistry, 124 Edward St., Toronto, Ontario, M5G 1G6. Tel: (416) 979-4404.

**March 28-April 4: 29th International Alpine Dental Conference** in Courchevel 1850, France. Contact: The International Dental Foundation, 53 Sloane St, London, SW1X 9SW, England.

## April/Avril 1992

**April 3-4: Southern Ontario Surgical Orthodontic Study Group Spring Meeting** in Windsor, Ontario. For more information, contact: Dr. Jeff Berger. Tel: (519) 258-2632.

**April 6-11: 25th International Dental Show** in Cologne, Germany. For information, contact: Verband der Deutschen Dental Industrie e.V., Pipinstrasse 16, W-5000 Köln 1, Germany.

**April 8-12: XI International Conference on Oral and Maxillofacial Surgery** in Buenos Aires, Argentina. For information and registration, contact the Secretariat at the following address: XI ICOMS, Casilla de Correo 4437, 1000 Correo Central, Buenos Aires, Argentina.

**April 29-May 3: 8th Annual Scientific Sessions of the American Academy of Cosmetic Dentistry** in Palm Springs, Calif. For more information, contact: Barbara Jo Zoelle, The American Academy of Cosmetic Dentistry, 2711 Marshall Ct, Madison WI 53705. Tel: (608) 238-6529.

**April 30-May 1: An International Symposium entitled "Restorative Dentistry - Toward the Year 2000"**. Presented by Dr. Stuart Isler and Dr. Mary Riley, being held at the Maurice and Gabriela Goldschleger School of Dental Medicine, Tel Aviv University, Israel. For more details, contact: Dr. Hart J. Levin, 2006 Bathurst Street, Toronto, Ontario, M5P 3L1.

## January/Janvier 1992

**January 25-February 1: 28th International Alpine Dental Conference** in Courchevel 1850, France. Contact: The International Dental Foundation, 53 Sloane St, London, SW1X 9SW, England.

**January 29-February 1: Miami Winter Meeting 1992 A Journey to Synergy** at the Hyatt Regency Miami. For further information, call (305) 667-3647 or (305) 944-5668.

## February/Février 1992

**February 8-15: Barbados Dental Association Convention.** For convention pre-registration (limited), travel and accommodation at group fares, please contact: Lynne Brandon CDA, 85 Lonsdale Dr, London, Ont N6G 1T4. Tel: (519) 657-4306 (evenings).

**February 10-15: Mid Winter Dental Convention and Maxillofacial Surgical Symposium,** Grand Barbados Beach Resort. For more details, contact: Dr. Derek H. Golding, Convention Chairman, Barbados Dental Association, P.O. Box 95, Bridgetown, Barbados. Tel: (809) 426-9140.

**February 12-16: Annual Convention of the Jamaica Dental Association** in Ocho Rios, Jamaica. For further information on registration, contact: Dr. Keith Williams, Chairman, Convention Committee, 8 Melmac Ave, Kingston 5, Jamaica, WI. Tel: (809) 92-68209.

**February 14: The Academy of Dental Materials and the University of Louisville Conference: Materials Research in Maxillofacial Prosthetics** in Chicago, Illinois. For details, contact: Dr. Lawrence Gittleman or Dr. Zafrulla Khan at the University of Louisville School of Dentistry. Tel: (502) 588-5045.

**February 15-16: Midwest Society of Periodontology 35th Annual Meeting** in Chicago, Illinois. Contact: Midwest Society of Periodontology, 1775 Glenview Rd., Suite 212, Glenview, Illinois 60025. Tel: (708) 724-6396.

**February 15-22: Dalhousie Ski Seminar** in Jasper, Alberta: "Achieving Excellence in Restorative Dentistry" and "Clinical Oral Pathology for General Dentists." Contact: Alumni Affairs and Continuing Education. Tel: (902) 494-1674.

**February 16-19: 127th Annual Midwinter Meeting of the Chicago Dental Society.** Contact: Chicago Dental Society, 401 N. Michigan Ave, Suite 300, Chicago, IL 60611-4205, USA. Tel: (312) 836-7300. Fax: (312) 836-7337.



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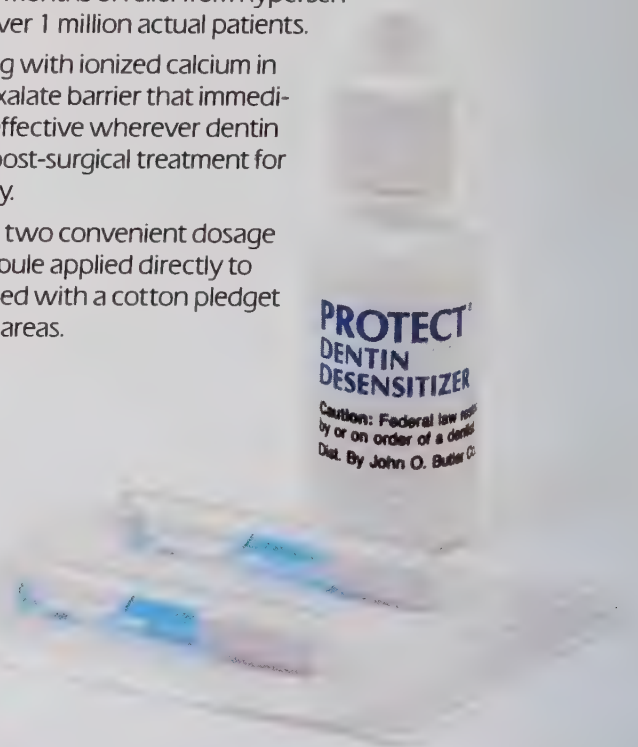
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Vol. 58  
No. 2

# JOURNAL

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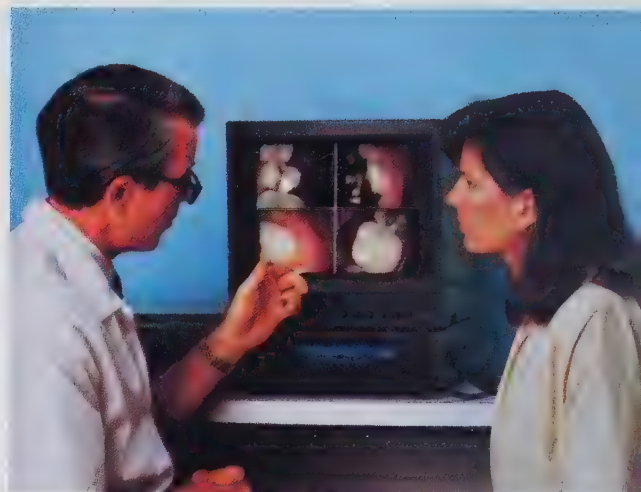
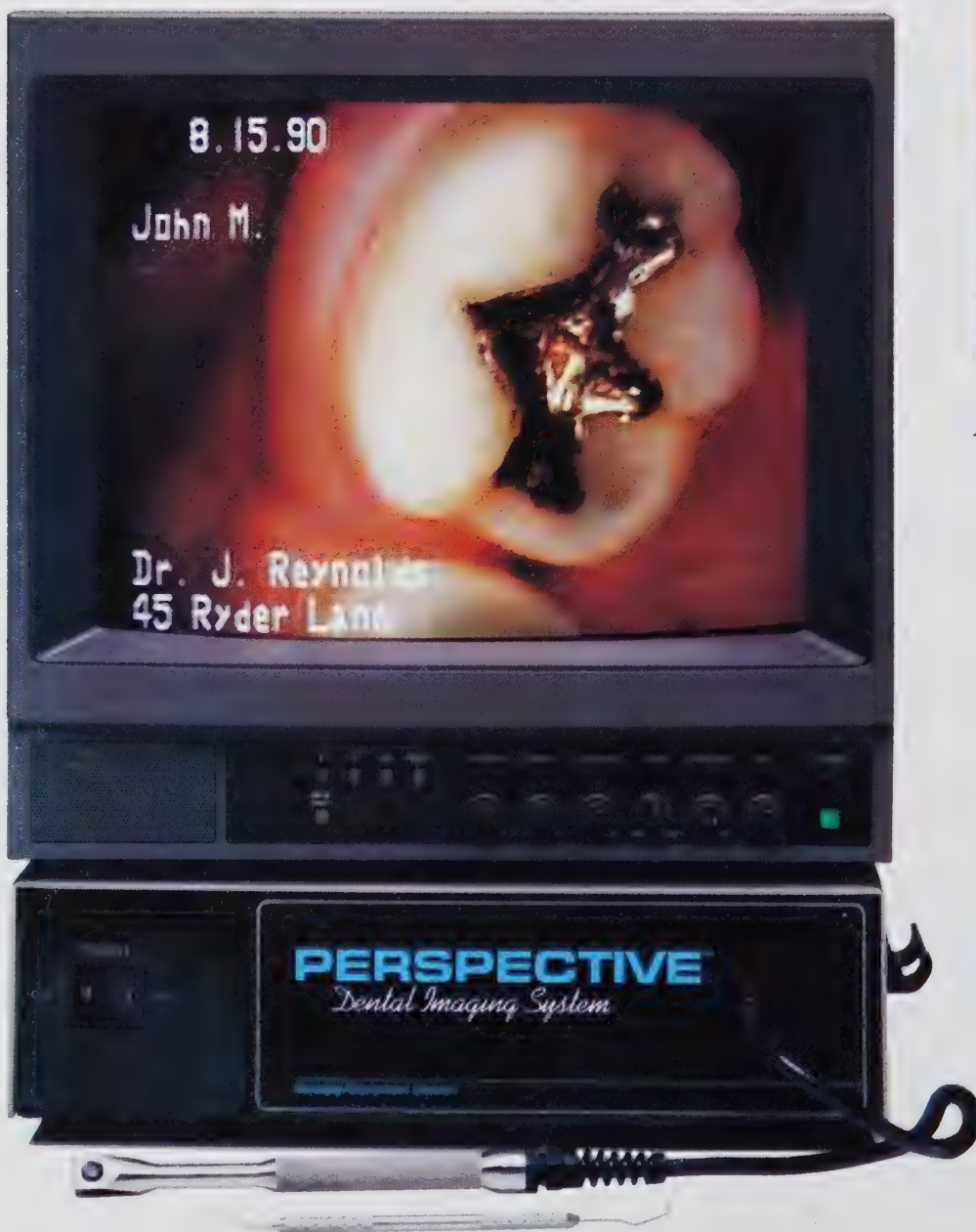
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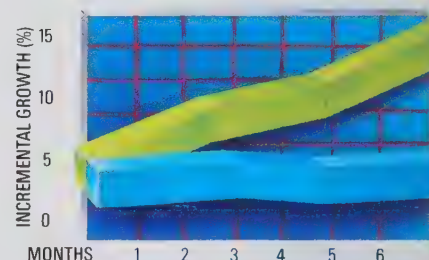
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## CDA MISSION STATEMENT

The Canadian Dental Association serves the dental profession — and through the profession the Canadian public — as the authoritative national voice and resource for dentists.

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# JOURNAL

Canadian Dental Association  
L'Association dentaire canadienne

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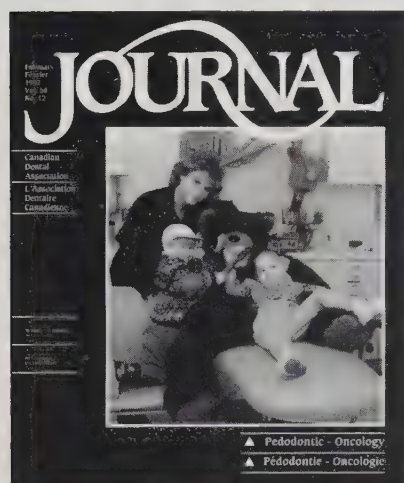
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Cover: Dr. Mary Larissa Krywulak of the  
Children's Hospital of Eastern Ontario with  
two of her oncology patients and a special  
friend.

(PHOTOGRAPH BY TEAL PHOTOGRAPHIC  
SPECIALISTS. SPECIAL THANKS TO THE  
CHILDREN'S HOSPITAL OF EASTERN ONTARIO.)

\* This is the first part of a two-part series. Look for  
more articles on pediatric oncology in the March  
issue of the *Journal*.



# Cosmetic Dentistry '92 A Desert Resort Rendezvous

**P**ALM SPRINGS,  
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**Walter F. Turbyfill, Jr.:** "Cosmetic  
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**Kenneth Glick:** "Porcelain Veneers"

**Carol Austin:** "Financing Cosmetic  
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**Harry Demaree:** "Office Design"

**Richard J. Lazzara:** "Esthetic Dental  
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**Laureen Langer:** "Cosmetic  
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**John Kanca:** "Dentin Bonding"

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## YOUTH, OUR HOPE FOR THE FUTURE

**W**e are living in stressful times. The media constantly remind us of the problems of the day – and there are millions of them, affecting billions of people. In a typical evening newscast, Canadians hear about the rise and fall of governments, the control of nuclear arms in the former Soviet Union, the hunger that besets 50 per cent of the earth's people, the failing economy and a litany of tragic deaths.

Mankind has always overcome the adversities of the day, however, and the human race has continued to advance. The force behind this progress is hope. Yes, hope – a desire, an expectation, a looking forward, a belief that things will get better or that science will find a way to improve the quality of life for everyone.

Hope infused with activity translates into fulfillment. It is what sent Columbus on his voyage half way around the world 500 years ago. It is what brought millions of immigrants to North America in the 1800s, many seeking an escape from despotism and famine. And it is hope that gives scientists the strength of character to suffer self-deprivation for the sake of discovery, and parents the strength to bring children into the world.

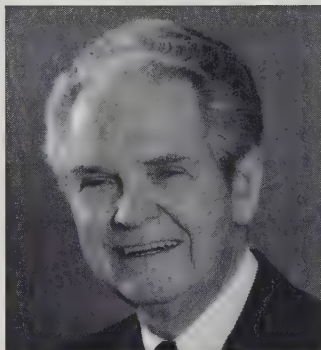
More than a hundred years ago, it was hope that prompted small groups of dentists across Canada to organize. First, they founded professional associations within provinces, and then, in 1902, a national association, CDA.

Hope is synonymous with youth. Nations, communities and associations all look to their youth to bring about a better future. We require the keen minds, the steady hands and the bountiful energy of youth to turn our hopes and dreams into reality.

Over the past few years, however, a disconcerting element is becoming more evident in dental association affairs. The professions are losing the support of their youth. In the November 18, 1991, issue of the *American Dental Association News*, Dr. Stewart Whitmarsh of Colorado posed the question, "How do ADA and the state and local organizations attract young dentists and retain them?" Nobody seems to know the answer.

Certainly, CDA's membership figures for the voluntary provinces, Ontario and Quebec, indicate a drop in support from recent graduates. Many students who enjoyed the benefits of CDA membership while attending dental school do not extend their membership after graduation.

Nor is the situation different for Canada's largest provincial association. In the December 1991 issue



Dr. Ralph Crawford

of *ODA News*, the Ontario Dental Association's newsletter, an editorial laments the fact that 35 per cent of the graduates from Ontario's two dental faculties will not join their provincial association. This will be a new low. And it appears that the dental associations are not alone in their need to attract more young members. The October 1991 *Canadian Medical Association Journal* reported that CMA's student membership is falling behind past levels. "The CMA is studying...the highest possible rate of

membership retention," says the association's board of directors. CMA is currently preparing letters to 'hard sell' the benefits of CMA membership, something that has never been done before.

CDA, like its sister organizations, seems to be at a loss to explain why younger dentists are not enthusiastically supporting organized dentistry. In its 90-year history, CDA has never offered members more benefits, but young dentists aren't responding. The "about-to-be" graduates interviewed by the *ODA News* cite bad economic times and high association fees as reasons for not joining their associations. But money problems are not new to dental graduates. And dentists in Canada have gone through devastating cycles before – two world wars and the depression of the 1930s – without withdrawing their support for CDA and the provincial associations. Why are they doing so now? Are there other reasons?

Is it because we are doing everything so well that young dentists feel we don't need them any more? Or is it because things are so bad that they feel there is no point in trying to fix them? Is it because we are living in a "what's in it for me generation." All our instincts tell us that none of these positions make much sense. What's the problem then?

We appeal to our youth. We need you. Tell us what we should be doing to gain your support. We need your new knowledge, your keen minds and your steady hands. We need your vitality to spark our experience. Without the hope generated by youth there can be no progress.

*Blessed is the generation in which the old listen to the young; and doubly blessed is the generation in which the young listen to the old.*

*(The Talmud)*

P. Ralph Crawford  
Editor, *Journal of the Canadian Dental Association*



**In case of personal disability...**

# will a lack of coverage add up to another problem?

No one plans on becoming sick or injured and unable to work — yet it can and does happen and *it can happen to you*. As you begin the recovery process, you really appreciate, *perhaps for the first time*, what a wise decision it was to obtain the protection of the Canadian Dentists' Insurance Program (CDIP) Long Term Disability and Office Overhead Expense Insurance.

Two separate plans, with two separate objectives, they work together to help you enjoy a financially worry-free recovery.

## Personal and practice protection

**CDIP's Long Term Disability Insurance** provides a source of income that allows you to maintain your pre-disability standard of living and meet continuing *personal* expenses related to shelter, food, clothing, car expenses, and more. CDIP LTD allows you to insure up to 100% of your pre-disability, net after-tax income to the overall Plan

maximum of \$6,000 per month.

**CDIP's Office Overhead Expense Insurance** is designed to pay the continuing expenses of your office during a period of personal disability. These include important items such as rent, employee salaries, lease payments, utilities, interest on loans made for the purchase of office equipment, etc., to the overall Plan maximum of \$15,000 per month.

## Rates lower than many private plans

The premiums involved are much lower than private plans due to the pooled buying power of CDIP... a small percentage of your earnings invested in these plans will be well justified by the *peace of mind* such coverage brings.

Take time now to review your coverage in these plans. Don't wait until you have a health problem to increase or apply for Long Term Disability Insurance to maintain your pre-disability lifestyle... or until on-going expenses that could be

met by the protection of Office Overhead Expense Insurance put the future of your practice in jeopardy.

Long Term Disability and Office Overhead Expense Insurance are two of the most important plans offered through CDIP — a program sponsored by the Canadian Dental Association and the co-sponsoring provincial dental associations and administered by CDSPI... coverage tailored to the needs of the dental profession.

## Ask for your free planning guide

We would be pleased to send you a free planning guide to help you determine the amount of coverage you need plus further detailed information on both plans. Call CDSPI toll-free today and ask to speak to a Personal Service Representative. After you have determined the coverage that is right for you, you can sit back and relax knowing you are protected against unforeseen problems.

**Available only to the dentists of Canada from your partners in personal and practice protection...**



CANADIAN  
DENTAL  
ASSOCIATION  
L'ASSOCIATION  
DENTAIRE  
CANADIENNE



**CDIP**

**1-800-561-9401**

Service in English

**1-800-665-9401**

Service in French

**1-416-296-9401**

Metro Toronto

**1-416-296-8920**

Fax



# President's Column

## CDSPI: Working For Us

What's going on with my insurance premiums? That was the question on the minds of many dentists late last year, shortly after the 1992 rates went out. Indeed, within a matter of hours, or so it seemed, I was answering calls from concerned practitioners.

As you are all aware by now, CDA, acting on the recommendation of Canadian Dental Service Plans Inc. (CDSPI), opted to change the carrier responsible for its basic life, dependents' life, long-term disability, staff and office overhead expense insurance programs in 1992. This decision was taken because of the unacceptable premium increases put forward by the existing carrier, Metropolitan Life.

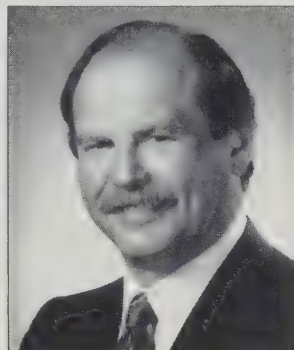
To ensure that the Canadian Dentists' Insurance Program (CDIP) continued to offer the best possible insurance plan and service package to Canada's dental profession, while maintaining its competitive rates, CDSPI (on behalf of CDA) put the program out for tender. In the end, after a careful review of the bids received, Prudential Group Assurance Company of England (Canada) was selected as the carrier of choice for 1992.

Although there have been rate increases in CDIP this year, we at CDA, along with our friends at CDSPI, believe that the new premiums are fair and competitive. They are, after all, based on an assessment, by Prudential, of the number and size of the claims settled through CDIP in recent years. That "claims experience" was also reviewed by the other carriers asked to quote on the CDIP contract, and was the basis for Metropolitan Life's planned premium increases.

CDSPI has traditionally kept the rates on our plans, and here I speak of life and disability, very low (perhaps too low). At the same time, it has offered truly CDA-orientated life-type insurance programs. But times have changed, and so must we and CDSPI.

Let's look for a moment at why the rates have increased. First, we have a large number of participants in CDIP who, like you and me, are getting older. And, as we know, CDSPI rates are grouped in five-year segments, with lower premiums for the younger practitioners and increasing premiums for older practitioners. That's only fair. Statistically, older practitioners are more likely to suffer from poor health, or whatever, and thus more likely to file a claim.

Second, in the past three years, we have used \$2,000,000 of the surplus funds available in our



*Dr. Les Allen*

life-plan to provide premium discounts to Canadian dentists. This may have created a false impression, namely that our rates for life-related plans were lower than the actual premiums being charged. (The life-plan rebates were around 20 per cent of the premium charged in most cases.)

Third, all insurance plans, not only ours, have shown very poor activity in the past few years. Recently, an executive in a large insurance company told me that his area was, unfortunately, the only growth area in his firm in 1991, and he handled disability claims. And

it was an increase in disability claims, more than anything else, that prompted Metropolitan Life to seek premium increases for CDIP. It's important to recall that CDSPI responded to this situation by doing everything in its power to ensure that our rates remained low and competitive.

These aren't all of the answers to the rate increase question, not by any means. We must remember that. But the insurance plans offered through CDIP are our plans, managed by our company, CDSPI. The CDSPI board is made up of corporate member representatives from CDA and nine of the provincial dental associations. It is there to serve the dental profession, to work for us.

CDIP plans are designed specifically to benefit the dentist and the dental family. They provide an outstanding membership service, but, importantly, that service is also a business. Now, in tough times, we must stay with it, support it, and encourage young graduates to participate in it.

CDSPI has performed well, on our behalf, for a number of years now. Despite that, it would be easy to fragment our insurance programs. Many individuals and insurance companies have tried to do just that, and their efforts will no doubt continue in the future. But check out our real track record. We've been there for the dentists of Canada over the long haul. And I believe that each and every day we are becoming more and more responsive to the needs of all our participants. To ensure our future success, however, we all must encourage our non-participating friends and associates to join us in supporting CDSPI, a real membership benefit to the dentists of Canada.

*Les Allen, B. Comm., DMD  
President of the Canadian Dental Association*



“CDA’s long-term disability benefits saved me. It’s that simple.”

*Dr. Dennis Wells,  
Ottawa, Ontario*



*Dividends — exclusive benefits like insurance, CDAnet, and a host of other free or discounted services. It’s one of the ways CDA works for you, and for dentists all across Canada.*

*Dr. Dennis Wells:  
Endodontist, cyclist — and  
member of CDA.*

*“After my heart transplant,  
I was out of practice for  
seven months. I’m back at  
work now because CDIP’s  
insurance plan supported  
me all the way.”*





# A Year of Celebration

**Editor's Note:** This month's "A Year of Celebration" is the second in a series of 12 articles that will be published in the Journal in 1992 to recognize anniversaries and historical events depicting the rich history of our country and profession.

## Ash Temple Assists University of Alberta's 75th Anniversary



Throughout 1992, the faculty of dentistry at the University of Alberta will be celebrating its 75th anniversary. Pictured above (left) is Mr. Douglas Whetstone, the Edmonton branch manager of Ash Temple Ltd., presenting a cheque for \$4,100 to Dr. G.H. Sperber, chairman of the faculty's 75th anniversary committee (centre) and dean Norman K. Wood (right). The gift will be used for academic activities scheduled throughout the year.

## 1891 – Nova Scotia Dental Association

Alfred Chipman Cogswell – Nova Scotia's leading dentist from the 1860s until the turn of the century – was born in Cornwallis, N.S., in 1834.

He attended Acadia College for two years before indenturing with Edwin Parsons in Portland, Maine, and moved to Halifax in 1859. In the winter of 1869, Dr. Cogswell attended the Philadelphia Dental College, obtaining his dental degree later that same year.

In 1869, Dr. Cogswell also made his first attempt to secure dental legislation in Nova Scotia, one year after the enactment of similar legislation in Ontario. His early efforts failed, but he didn't give up, pursuing his legislation objective over the next 20 years.

Dr. Cogswell's persistence finally paid off on May 19, 1991, when the act incorporating the Nova Scotia Dental Association was passed by the provincial legislature.

## 1868 – Ontario Dental Act 1st in the World

Following the founding of the Ontario Dental Association on July 2, 1867, the next step was to obtain a dental statute. To that end, a petition signed by 68 dentists, 25 medical men, one judge, the mayor of Toronto, and a druggist was addressed to the Ontario legislative assembly – the first petition in Canada following Confederation – calling for the passage of the necessary legislation.

Some dentists opposed the proposed bill, on the grounds that they didn't want the government interfering with their private affairs. However, rumor has it that most of the opposition came from dentists who wouldn't qualify under the bill's proposed "grandfather clause," which granted recognition without examination only to those dentists who had been constantly engaged for a period of five years in an established office practice.

Despite opposition from the vociferous anti-legislation side, more than 100 dentists and their supporters marched on the legislature to encourage the introduction of the bill, which, with some minor amendments, became law on March 4, 1868.

It was the first act, dealing solely with dentistry, to be adopted anywhere in the world.

## Sir Frederick Grant Banting – 100 years

Frederick Grant Banting was born in a farm house near Alliston, Ontario, on November 14, 1891. From those humble roots, this Canadian hero embarked on a career that would lead to one of the most significant medical discoveries of the 20th century.

In the summer of 1921, Banting began pancreatic research at the University of Toronto with professor J.J.R. MacLeod. The two men were soon joined by a young graduate physiology student, Charles Best. In December, J. Bertram Collip, a professor of biochemistry at the University of Alberta, also associated himself with the Toronto group. Through Collip's efforts, the researchers were successful in obtaining

a highly-potent extract from islets of Langerhans.

On January 11, 1922, injections of pancreatic extract were administered to a dying 14-year diabetic patient in Toronto General Hospital. The boy's miraculous cure ushered in a medical milestone – the discovery of insulin – that has meant life fulfilment for millions around the world.

Banting, Best and Collip's original 1922 article, "Pancreatic extracts in the treatment of diabetes mellitus: preliminary report," is reprinted in the November 14, 1991, issue of the *Canadian Medical Association Journal*.

In 1922, Banting and MacLeod shared the Nobel Prize for Medicine. Knighted in 1934, Sir Frederick Banting died on February 21, 1941, following an airplane crash in Newfoundland.

## Canada Celebrates Diamond Jubilee of Independence

Sixty years ago, Canada achieved its "independence" from Great Britain. On December 11 1931, the passage of the Statute of Westminster by the British Parliament finally created the independent state of Canada. (The British North America Act of 1867, although it brought about "Confederation," still bound Canada to Britain. Until December 1931, Canadian legislation was still subject to veto by a British government official, the governor general, and Canadian foreign affairs – from treaties, to declarations of war, peace negotiations and international trade – were controlled from London.)

With the passage of the Statute of Westminster, Britain gave up the right to pass laws for Canada and to overrule federal or provincial legislation. The governor general became a representative of the monarch, and not the British government, and Canada acquired the right to veto or assent to any change in the monarchy.

But Canadians celebrated their independence slowly. There was no such thing as Canadian citizenship until 1947, and the country didn't fly its own flag until 1965. Appeals of Supreme Court of Canada rulings could be heard by the British Privy Council until 1949, and Canadian governors general were appointed by Britain until 1952. God Save the Queen was our National Anthem until 1980.



# Announcements

## NATIONAL HIGHLIGHTS

**March 21-25, 1992**  
**Association of Prosthodontists of Canada**  
**and the Canadian Association of**  
**Oral & Maxillofacial Surgeons**  
**Banff, Alberta**  
 Dr. Lawrence St. Pierre (705) 737-0607  
 Dr. Brian Kucey (403) 468-7270

**March 26-28, 1992**  
**B.C. Dental Meeting**  
**Vancouver Trade & Convention Centre**  
**Vancouver, British Columbia**  
 (604) 736-3645

**May 3-7, 1992**  
**Les journées dentaires**  
 (514) 875-8511

**May 14-16, 1992**  
**ODA Spring Meeting**  
**(125th Anniversary)**  
**Toronto, Ontario**  
 (416) 922-3900

**May 30, 1992**  
**New Brunswick Dental Society**  
 (506) 452-8575

**June 18-20, 1992**  
**Newfoundland Dental Association**  
 (709) 579-2362

**August 28-30, 1992**  
**44th Annual Scientific Session**  
**Canadian Association of Orthodontists**  
**Calgary, Alberta**  
 (416) 491-3186

**August 29-September 2**  
**1992 Canadian Dental Association**  
**Annual Convention**  
**Calgary, Alberta**  
 Janice Edgar (613) 523-1770  
 (outside Canada)  
 1-800-267-6364 (East) or  
 1-800-267-6354 (West)

**April 29-May 3: 8th Annual Scientific Sessions of the American Academy of Cosmetic Dentistry** in Palm Springs, Calif. For more information, contact: Barbara Jo Zoelle, The American Academy of Cosmetic Dentistry, 2711 Marshall Ct, Madison WI 53705. Tel: (608) 238-6529.

**April 30-May 1: An International Symposium entitled "Restorative Dentistry - Toward the Year 2000"**. Presented by Dr. Stuart Isler and Dr. Mary Riley, being held at the Maurice and Gabriela Goldschleger School of Dental Medicine, Tel Aviv University, Israel. For more details, contact: Dr. Hart J. Levin, 2006 Bathurst Street, Toronto, Ontario, M5P 3L1.

## May/Mai 1992

**May 1-3: Academy of Sports Dentistry** meeting being held in Hartford, Connecticut. For information, contact: Dr. A.W.S. Wood, 1553 Randor Dr., Mississauga, Ontario, L5J 3C6. Tel: (416) 823-2008.

**May 7-8: Association Internationale Francophone de Recherche Odontologique 9th Colloquium** will be held at the University of Montreal in Montreal, Quebec. For details, contact: Dr. Daniel Grenier, secretary of AIFRO, Faculté de Médecine Dentaire, Université de Montréal, Montréal, Québec. Tel: (514) 343-2385.

**May 9-13: 46th Annual Meeting of the American Academy of Oral Pathology** in San Francisco, California. For information, contact: Dr. John M. Wright, Secretary-Treasurer, American Academy of Oral Pathology, Baylor College of Dentistry, 3302 Gaston Ave, Dallas, Texas 75246. Tel: (214) 828-8110.

**May 10-13: Annual Conference of the Canadian Long Term Care Association** in Winnipeg, Manitoba. Inquiries, contact: Mary Peterson Elias, Continuing Education Division, University of Manitoba, Winnipeg, Manitoba, R3T 2N2. Tel: (204) 474-9923.

**May 14: University of Toronto Class of '67 Reunion** celebrating 25th year in the main ballroom of the Admiral Hotel in Toronto. For more details, contact: M. Naiberg, 8199 Yonge St., Suite 404, Thornhill, Ontario. Tel: (416) 889-0810.

**May 23-30: Travel and Learn Cruise to Alaska** departing from Vancouver, British Columbia on the Regal Princess. Contact: University of British Columbia, Continuing Dental Education, 105-2194 Health Sciences Mall, Vancouver, BC, V6T 1Z3. Tel: (604) 822-2627.

## July/Juillet 1992

**July 1-4: 12th International Symposium on Dental Hygiene the Hague** will be held at the Netherlands Congress Centre in The Hague. For more information contact: Secretariat, Van Namen & Westerlaken Congress Organization Services, "Dental Hygiene Symposium", PO Box 1558, 6501 BN Nijmegen, the Netherlands.

## August/Août 1992

**August 7-10: 3RD Singapore International Dental Exhibition & Conference** in Singapore. For more details, contact: SDEC '92, Orchard Dental Centre Pte Ltd, 268 Orchard Rd, #05-07, Singapore 0923.

**August 9-14: 70th Annual Dental Association of South Africa Congress** in Sun City, South Africa. For information, contact: Helmut Heydt, DASA Congress, Private Bag 1, Houghton 2041, South Africa.

**August 20-25: Canadian Society of Forensic Science Annual Conference** will be held in Halifax, Nova Scotia. For more information, contact: Fredricka Monti, Canadian Society of Forensic Science, Suite 215 - 2660 Southvale Crescent, Ottawa, Ontario, K1B 4W5 or call: (613) 731-2096.

## February/Février 1992

**February 8-15: Barbados Dental Association Convention.** For convention pre-registration (limited), travel and accommodation at group fares, please contact: Lynne Brandon CDA, 85 Lonsdale Dr, London, Ont N6G 1T4. Tel: (519) 657-4306 (evenings).

**February 10-15: Mid Winter Dental Convention and Maxillofacial Surgical Symposium,** Grand Barbados Beach Resort. For more details, contact: Dr. Derek H. Golding, Convention Chairman, Barbados Dental Association, P.O. Box 95, Bridgetown, Barbados. Tel: (809) 426-9140.

**February 12-16: Annual Convention of the Jamaica Dental Association** in Ocho Rios, Jamaica. For further information on registration, contact: Dr. Keith Williams, Chairman, Convention Committee, 8 Melmac Ave, Kingston 5, Jamaica, WI. Tel: (809) 92-68209.

**February 14: The Academy of Dental Materials and the University of Louisville Conference: Materials Research in Maxillofacial Prosthetics** in Chicago, Illinois. For details, contact: Dr. Lawrence Gettleman or Dr. Zafrulla Khan at the University of Louisville School of Dentistry. Tel: (502) 588-5045.

**February 15-16: Midwest Society of Periodontology 35th Annual Meeting** in Chicago, Illinois. Contact: Midwest Society of Periodontology, 1775 Glenview Rd., Suite 212, Glenview, Illinois 60025. Tel: (708) 724-6396.

**February 15-22: Dalhousie Ski Seminar** in Jasper, Alberta: "Achieving Excellence in Restorative Dentistry" and "Clinical Oral Pathology for General Dentists." Contact: Alumni Affairs and Continuing Education. Tel: (902) 494-1674.

**February 16-19: 127th Annual Midwinter Meeting of the Chicago Dental Society.** Contact: Chicago Dental Society, 401 N. Michigan Ave, Suite 300, Chicago, IL 60611-4205, USA. Tel: (312) 836-7300. Fax: (312) 836-7337.

**February 22-29: Virgin Islands Dental Association Convention.** For convention pre-registration (limited), travel and accommodation at group fares, please contact: Lynne Brandon CDA, 85 Lonsdale Dr., London, Ont N6G 1T4. Tel: (519) 657-4306 (evenings).

## March/Mars 1992

**March 8-12: The 15th Asian Pacific Dental Congress** in Auckland, New Zealand. For registration forms, contact: New Zealand Dental Association, PO Box 28 084, Remuera, Auckland, New Zealand.

**March 26-28: World Congress XII for Oral Implantology** in Sydney, Australia. For details, contact: Margaret M. Jackson, Executive Director, The International Congress of Oral Implantologists, 248 Lorraine Ave, Upper Montclair, NJ 07043, USA. Tel: (201) 783-6300. Fax: (201) 783-1175.

**March 27: George C. Hare Lectureship: Dr. James L. Gutmann on "Parameters of Clinical Success in Endodontic Treatment and Retreatment"** at the University of Toronto. For more details, contact: University of Toronto, Faculty of Dentistry, 124 Edward St., Toronto, Ontario, M5G 1G6. Tel: (416) 979-4404.

**March 28-April 4: 29th International Alpine Dental Conference** in Courchevel 1850, France. Contact: The International Dental Foundation, 53 Sloane St, London, SW1X 9SW, England.

## April/Avril 1992

**April 3-4: Southern Ontario Surgical Orthodontic Study Group Spring Meeting** in Windsor, Ontario. For more information, contact: Dr. Jeff Berger. Tel: (519) 258-2632.

**April 3-5: 4th Annual Conference on Special Care Issues in Dentistry.** Co-sponsored by the Federation of Special Care Organizations and the American Dental Association. Held in Chicago at the Sheraton Chicago Hotel and Towers. For details, contact: (312) 440-2660.

**April 6-11: 25th International Dental Show** in Cologne, Germany. For information, contact: Verband der Deutschen Dental Industrie e.V., Pipinstrasse 16, W-5000 Köln 1, Germany.

**April 8-12: XI International Conference on Oral and Maxillofacial Surgery** in Buenos Aires, Argentina. For information and registration, contact the Secretariat at the following address: XI ICOMS, Casilla de Correo 4437, 1000 Correo Central, Buenos Aires, Argentina.



# News Update

## Ontario Dentist Elected President of Prosthodontists' Association



Dr. Lawrence St. Pierre

Dr. Lawrence St. Pierre, a private practitioner from Barrie, Ontario, was elected president of the Association of Prosthodontists of Canada at the organization's annual meeting in Quebec City last August.

Dr. St. Pierre received his dental degree from the University of Toronto in 1975 and completed his graduate training in prosthodontics at the William Beaumont Army Medical Centre in El Paso, Texas, in 1982.

Other officers elected by the association were: president-elect, Dr. Ronald Fisher, Montreal; and vice-president, Dr. Jack Gerrow, Halifax. Dr. Brian Kucey of Edmonton continues to serve as secretary-treasurer.

The association's 19th annual scientific meeting will be held in Banff, Alberta, in conjunction with the Canadian Association of Oral and Maxillofacial Surgeons, March 20-25, 1992.

## Periodontists Name New Executive

The Canadian Academy of Periodontology named the members of its new executive last October, during the group's annual meeting in Vancouver, British Columbia.

Dr. Dan Morrow of London, Ontario, now serves as president. He is joined on the executive by: Dr. Malcolm Miller of Calgary, Alberta, immediate past-president; president-elect, Dr. Robert Fortier,

Sherbrooke, Quebec; secretary, Dr. Peter Munns, Vancouver, B.C.; treasurer, Dr. Marvin Budd, Toronto, Ontario, and editor, Dr. Michel Couture, Montreal, Quebec.

Dr. Morrow received his dental degree (1968) and a PhD in oral pathology (1979) from the University of Manitoba. He completed studies for a certificate in periodontics at Dalhousie University in 1981. Dr. Morrow served in the Canadian Armed Forces from 1968 until 1987, retiring with the rank of Lieutenant-Colonel. He is currently chairman of the department of periodontics at the University of Western Ontario.

## Have Sterilizer, Will Travel



*A sterilizer, manufactured by Cox Sterile Products of Dallas, Texas, was recently transferred via "yak backpack" to the Namche Bazaar Dental Clinic. The clinic, located on the trekking path to Mount Everest in the Himalayan mountains at an elevation of 11,500 feet, is operated by Dr. Brian Hollander of the American Himalayan Oral Health Organization.*

## Classmates Awarded Order of Canada

Two prominent Toronto dentists, Drs. John MacDonald and Arthur Wood, who attended the University of Toronto's dental faculty at the same time, have been appointed to the Order of Canada.

Both men, who graduated one year apart, have had outstanding and distinguished careers in divergent dental fields. Their achievement is remarkable,

as the Order of Canada has been awarded to only a few Canadians, and to even fewer Canadian dentists.



Dr. John MacDonald (left) receives the Order of Canada from Governor General Ray Hnatyshyn.

## Dr. John B. MacDonald

Dr. MacDonald graduated with honors from Toronto's faculty of dentistry in 1942 (one year ahead of Dr. Wood) and served as a captain in the Canadian Dental Corps from 1944 until 1946. In 1948 he received his M.Sc. in bacteriology from the University of Illinois and, after a stint in the department of bacteriology at U of T, he earned his PhD at Columbia University, New York, in 1953.

From 1956 to 1962, Dr. MacDonald was the director of the Forsyth Dental Infirmary and a professor of microbiology at the Harvard School of Dental Medicine.

In 1962 he was appointed as president of the University of British Columbia – the first dentist in Canada to head a major university. He held the post until 1967.

For more than 30 years, some of the most prestigious and profound research organizations have benefitted from Dr. MacDonald's expertise. He has served as a consultant for: the Science Council of Canada; the Canada Council on Support of Research in Canadian Universities; the Addiction Research Foundation; the National Institute of Health; the Canadian International Development Agency; the Minister of State for Science; the Harvard Training Centre for Clinical Scholars in Oral Biology; and



the Royal Society of Canada; among others.

Dr. MacDonald has been a member of numerous learned associations and has contributed widely to the insight, planning and excellence of higher scientific education. He served a term as the president of the International Association of Dental Research in 1968, and was the chairman of the Task Force on Medical Manpower in Ontario from 1981-83. In 1985-86 he was chairman of the Working Group on Dental Research, part of the Medical Research Council of Canada.

The Canadian Dental Association has also been a fortunate recipient of Dr. MacDonald's scholarly astuteness and perception. He was a member of the CDA research committee from 1949 to 1954 and served as its chairman for three years. In 1973, in his capacity as chairman of the Task Force on the Future of the Canadian Dental Association, he helped set a new course for CDA, strengthening the national association's ability to better serve its members throughout the '70s, '80s and on into the present day.



*Dr. Arthur Wood (left) receives the Order of Canada from Governor General Ray Hnatyshyn.*

#### **Dr. Arthur Wood**

Dr. Wood graduated from the University of Toronto in 1943. He was the first Canadian to seek post graduate training in pedodontics, graduating from the University of Illinois in 1949, and still practises his specialty in Toronto today.

Dr. Wood first became interested in sport's dentistry in the early 1950s

when, as a minor league coach, he became concerned about the number of young hockey players suffering head and mouth injuries. To correct the problem, Dr. Wood and fellow coach Charlie Patterson, an engineer and researcher at Toronto's York University, took it upon themselves to develop protective sports gear.

The two pioneers set up shop in Dr. Wood's basement, which was soon transformed into a research laboratory. Their initial work – Dr. Wood concentrated on protective devices for the mouth, while Mr. Patterson designed protective helmets – led to a tremendous decrease in sports-related injuries.

One of Dr. Wood's greatest triumphs was the development of "Allan Average" – the head form now used for testing the fit and effectiveness of head, facial and oral protective devices. The head form, a Canadian Standards Association project, was designed with input from anthropologists, ophthalmologists, plastic surgeons, computer scientists and dentists – notably, Drs. Wood, Frank Pulver and Frank Popovich.

Allen Average was the head form of a 10-year-old male. Since then, head forms of both a 12-year-old male and a 12-year-old female have been developed. Dr. Wood was recently informed that the Canadian Standards Association has granted funding for the development of head forms of 18-year-olds.

Never one to be interested only with his practice and the development of sports protective devices, however, Dr. Wood is actively involved with a number of professional associations, and is a past president of the Canadian Society for Children, the Academy of Pedodontics and the Academy of Sports Dentistry.

Dr. Wood has received numerous honors – the Order of Canada will be his fifth award in the past 12 months – including the Award of Merit from the Canadian Standards Association, the Canada Volunteer Award (from Health and Welfare Canada), the Alumni Distinction Award from the University of Toronto and the Paul Harris Rotary Award for community service. CDA recognized his contributions through the presentation of the Distinguished Service Award in 1985.

At 74, Dr. Wood still maintains a private practice two days a week at his Islington, Ontario, office. He continues to be very involved with all aspects of sports safety – his current project is to have a film and kit produced on the fabrication of custom mouth guards.

## **CDA Sponsors National Dental Epidemiology Workshop**

A workshop – sponsored and supported by CDA and the dental faculty of Dalhousie University – was held in Halifax last fall to review the objectives of the National Dental Epidemiology Project (see "Health and Welfare Funds Formulation Grant for National Dental Epidemiology Project," *JCDA* 57:437, 1991).

The project, developed over the last three years by CDA's project coordinating committee, is meant to assist in the formulation of public health, health promotion and educational plans for governments, the dental profession and dental faculties – based on the needs and demands of a representative sample of Canadians.

Chaired by Dr. G.W. Thompson of Edmonton, the coordinating committee's current members include: Drs. A.I. Ismail and K. Zakariassen of Halifax; Dr. J.M. Brodeur, Quebec City; Dr. M. Payette, Montreal; Dr. D. McFarlane, Toronto; Dr. D. Banting, London, Ontario; and Dr. M. MacEntee, Vancouver.

The participants at the Halifax workshop set the following objectives:

1. To estimate the prevalence of certain dental conditions in representative samples of individuals, selected from each Canadian province, as well as their oral treatment needs.

2. To estimate the oral health status, preventive habits and attitudes of Canadians, as well as their demand for and use of dental services.

3. To identify the population groups with the highest level of dental caries, periodontal diseases and other oral conditions (for the purpose of targeting private and public preventive and treatment programs).

4. To provide directions for dental programs, as well as estimates of the need for dental services, which could then be used in the modelling of dental personnel needs.

An overall proposal will be submitted to the National Health Research and Development Program of Health and Welfare Canada for funding. If it is accepted, a pilot study would be initiated in 1993.

## **Canadian Dentists Serve Third World**

"Volunteer dentistry in developing countries is always challenging, diffi-



# Introducing the Braun Oral-B Plaque Remover.

## It removes even the most stubborn excuse.

You've probably heard why patients can't seem to brush properly. Or even regularly. But now it's easy for them to remove plaque effectively, every time they brush. Presenting the Braun Oral-B Plaque Remover, designed with the clinical evaluation of leading dental professionals. Patients immediately appreciate the oscillating motion, the optimum speed, and the soft, polished, end-rounded Oral-B bristles. The small, round head makes it easy to use, even for children, and the cup-shaped bristle formation gently hugs the tooth and smoothly whisks away plaque. It even works well with any toothpaste.

The Braun Oral-B Plaque Remover. Designed, built, and backed by two great names. It removes more than plaque. It removes excuses.

Find out more about this important new aid to patient compliance. For complete product information, as well as details on a special introductory offer, contact your Oral-B representative.



Unique oscillating, counter-rotational brush head motion simultaneously places end-rounded bristles deep between teeth and along the gumline for exceptional plaque removal.

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The Braun Oral-B Plaque Remover is Acceptable as an effective cleaning device for use as part of a program of good oral hygiene to supplement the regular professional care required for good oral health. Council on Dental Materials, Instruments and Equipment: American Dental Association





cult and unpredictable, but the rewards are truly beyond words," says Dr. Stuart Robertson of Ottawa, Ontario, who has served as a volunteer dentist in Haiti. "To be of help to people in such desperate need, who deeply appreciate any and all help you can give them, is the ultimate in job satisfaction."

It's also hard work, as members of three dental teams found out recently, when they left the amenities of their modern practices behind to relieve dental suffering in far-flung lands. Nevertheless, on returning to Canada, each team echoed the sentiments of Dr. Robertson – the needs and rewards are over-whelming. This is their story...

#### **HAITI – Dr. Stuart Robertson, Ottawa, Ontario.**

Dr. Robertson has seen dentistry from both sides in Haiti. He's dispensed dental care in a fully-equipped clinic in Port au Prince, and in the open air, from a kitchen table and chair set under a tree in a mountain village.

"Only two major dental treatment modalities are feasible," says Dr. Robertson. "The first is simply the alleviation of pain. In situations where there is no running water or electricity, a badly decayed tooth must be extracted. The second major area to be stressed is prevention. I have worked through schools and church groups, and I always try to encourage teachers and community leaders to arrange for instruction in basic oral hygiene for children."

Dr. Robertson also reported that a number of diseases which are almost eradicated in Canada are still common in Haiti, notably severe malnutrition, rickets, tuberculosis, typhoid and polio.

#### **MOZAMBIQUE – Dr. Murray Dickson, Saskatoon, Sask.; Dr. Joel Rosenbloom, Toronto, Ontario**

Mozambique is the poorest nation on earth.

Located in Africa, the country tops the Population Crisis Committee's "scale of human suffering." Everything is in short supply – including dentists. In fact, there are only 12 dentists in Mozambique, a country of 14 million people. That's a ratio of one to 1.2 million.

In recent years, Canada has supplied two of Mozambique's dentists, Dr. Murray Dickson from Saskatchewan and Dr. Joel Rosenbloom of Toronto. Both Canadians were recruited by Canada's international development organization, CUSO.

Drs. Rosenbloom and Dickson's work focuses on community dental health and leadership, so that Mozambicans will be prepared to take responsibility for programs that they will plan and administer themselves. The concept, developed in the 1980s, involves placing "dental agentes" – similar to Canadian dental therapists – in every Mozambique district.

(Canada pioneered Third World dental aid from 1985 to 1988, when it trained 17 Mozambicans as dental therapists. The 17 completed a post-graduate study program offered by the National School of Dental Therapy in Prince Albert, Saskatchewan.)

Dr. Dickson, now 47, remembers his posting to Mozambique as a marvellous experience for his whole family. His

wife, Gerri, a public health nurse, worked as a nurse tutor, and the couple were accompanied by their two teenage sons.

"You have to really want to be there," says Dr. Rosenbloom, who had previously worked as a dentist in a refugee camp in Ethiopia. "There are a lot of frustrations, but there is also a sense of satisfaction. It's a valuable experience."

#### **HONDURAS – Dr. Rod Johnston, Corbeil, Ontario.**

Dr. Rod Johnston had often talked about the time he spent in Honduras as a dental student in 1978. Little did he think that he would return there 12 years later with his entire dental staff – receptionist, Barb McKeever; hygienist, Nancy Vincent, and dental assistants,



*Dr. Rod Johnston, Corbeil, Ontario: "This is just one of the many line-ups of Hondurans we saw each day."*



*Dental clinic in Honduras: (left to right) Barb McKeever, receptionist, Corbeil, Ontario; Dr. Bob Zimmerman, U.S.A.; Norma Wheatley, dental assistant, Corbeil; Dr. Rod Johnston, Corbeil.*



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*Dr. Murray Dickson of Saskatchewan demonstrates to Mozambican trainees the art of examining and providing prophylaxis.*



*Dr. Murray Dickson of Saskatchewan and Dr. Joel Rosenbloom of Toronto, Ontario, confer with health care workers in Mozambique.*



*Dr. Stuart Robertson's dental clinic in Haiti — No running water, no hydro, bring your own equipment.*



*Corbeil, Ontario, hygienist Nancy Vincent scales Honduran patient's teeth with flash-light illumination.*

Nathalie Lawson and Norma Wheatley.

When Dr. Johnston moved to Corbeil to start a new dental practice in 1988 he promised his staff that, if everything went smoothly, he would take them somewhere "far away" on a course. Two years later, when the practice was established, he asked them where they would like to go. He thought they would answer England, or perhaps they'd want to visit exotic Hawaii. But the staff said, "Honduras!"

Dr. Johnston made all the travel arrangements with the Evangelical Medical Aid Society (EMAS), but the team was responsible for financing their own airfare and dental supplies. Three Canadian dental supply houses, Ash Temple, Healthco and Northern Surgical Supply, donated all the gloves, anesthetic and gauze sponges.

The Corbeil group's destination was a village of 200 people in southwestern Honduras. There they joined another dentist, five physicians, a pharmacist, nurses and other auxiliaries. For their two-week visit, Dr. Johnston and his staff shared the health care team's headquarters in the village school. The women slept on the floor of one classroom and the men in another. Windows were only slat-covered openings, there was no running water and three out-houses served as "facilities."

Poverty was everywhere. Many 35- to 40-year-old mothers had only one dress, usually sewn and patched together, and all of them were barefoot. Most families had at least 12 or 13 children, yet a farm worker in Honduras earns less than \$2 (Cdn) a day and a bricklayer around \$36 a month. An in-



expensive pair of children's running shoes cost \$8 – a week's wages for most people.

"Every simple procedure posed a challenge," said Dr. Johnston. "We had three folding dental chairs, which were bolted in a sitting position, and nothing else. We had no lights or stools, just 6,000 carpules of anesthetic, 15,000 gloves and cold sterilization. We had five basins for water, and there was only enough water to fill them once a day."

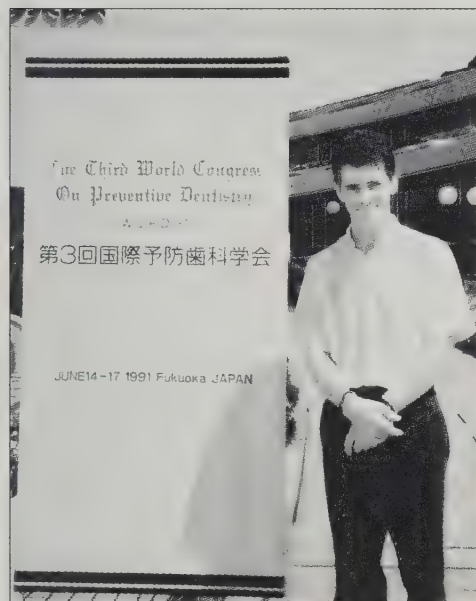
*Canadian dentists who want further information about serving in Third World countries can contact either CUSO or EMAS:*

**CUSO**, 135 Rideau Street, Ottawa, Ontario K1N 9K7

**EMAS**, Box 160, Warkworth, Ontario K0K 3K0

## Laval Student Attends 3rd World Congress on Preventive Dentistry

Pierre Isabelle, a fourth year dental student at the University of Laval, says his four-day visit to the Third World



*Mr. Pierre Isabelle, senior dental student, Laval University, attended the Third World Congress on Preventive Dentistry in Japan in June 1991.*

Congress on Preventive Dentistry was an interesting "side-trip" to his summer work project in Japan.

Mr. Isabelle, a former student representative on the CDA student affairs committee, went to Japan last summer after completing his third year of dental school. He had obtained a "working holiday" visa through the Japanese embassy, with the aim of teaching English

in Kumamoto City in southern Japan.

By coincidence, the Third World Congress on Preventive Dentistry was held from June 14-17 in Fukuoka, less than 100 kilometres from Isabelle's teaching position in Kumamoto City.

Over 1,000 participants from 28 countries attended the meeting. The goal of the congress was to advance preventive dentistry and assist in achieving the target set by the World Health Organization, "Oral Health for All by the Year 2000." A total of 65 research papers were presented during the event.

## New CFDE Appointments

Dr. Kenneth C. Bentley, the chief of dentistry at Montreal General Hospital, has been appointed chairman of the ad-



*Dr. Kenneth C. Bentley*



*Dr. Marcia Boyd*

visory committee on fellowship selection for the Canadian Fund for Dental Education (CFDE), replacing Dr. Gordon Nikiforuk. Dr. Nikiforuk is a former



*Dr. Gordon Thompson, CFDE Chairman*



*Dr. François M. Bourassa*

dean of the University of Toronto's dental faculty.

Dr. Bentley will be joined on the committee by Dr. Marcia A. Boyd, the associate dean of the dental faculty at the University of British Columbia, who has accepted an appointment as a committee member.

Previously, CFDE approved Dr. Gordon W. Thompson, the chairman of the department of dental health care at the University of Alberta dental faculty, as its new chairman. Dr. Thompson has been a member of the CFDE Board of Trustees since 1986. In addition, Dr. François Bourassa of Regina was approved as the newest member of the board.

## CDA 1992 Award Nominations Sought

CDA is seeking nominations for its 1992 awards, including CDA Honorary Membership, Distinguished Service, and the Award of Merit.

Nominations received by March 30



will be reviewed by the CDA nominations, awards and trusts committee, which will then make recommendations on award recipients to the association's executive council. The 1992 award recipients will be named during the annual meeting of the CDA Board of Governors August 28-29 in Calgary, Alberta.

No more than one individual should be proposed for Honorary Membership or the Distinguished Service Award, and submissions must include detailed curriculum vitae for each nominee. Although submissions should indicate the award an individual is being nominated for, the nominations committee reserves the right to recommend which award, if any, will be granted to that person.

### Honorary Membership

The association's highest honor is honorary membership, which recognizes individuals deemed to have made outstanding contributions to the art and science of dentistry, or to the dental profession, over a sustained period of time. These contributions can be provincial, national or international in nature.

In general, only one or two honorary memberships are awarded annually, and CDA may elect not to present this award in any given year. Winners receive a personalized parchment scroll and a lapel pin. Honorary members who are licensed dentists are exempt from CDA membership dues, and all recipients may attend association-sponsored scientific and social functions, as well as annual meetings and conventions, at no cost.

### Distinguished Service Award

CDA's Distinguished Service Award is presented to dentists or laymen to recognize either an outstanding contribution in a given year, or outstanding service over a number of years. It may also recognize outstanding contribu-

tions to the dental profession at the academic, corporate, specialty society, council or committee level. Recipients receive an engraved plaque.

### Award of Merit

The Award of Merit is presented annually to an individual who has served in an outstanding capacity in the governing of CDA or made a similar contribution to Canadian dentistry. Candidates should have served at least two full terms as a governor of the association and two full terms on the executive council, or four years as a council, commission or committee chairman, or a number of years with a dental organization, institution or specialty section.

The recipient receives an engraved plaque.

### Certificate of Merit

The Certificate of Merit recognizes special service at any level of dentistry. In general, it is reserved for Canadian dentists and other individuals who have given at least one full term of service on a council or committee of CDA, or long-standing service at the corporate or spe-

cialty society level.

The awards committee will not receive nominations for this award. Recipients will be selected by the committee.

Nominations for Honorary, Membership, Distinguished Service or the Award of Merit should be submitted by March 30 to: CDA Committee on Nominations, Awards and Trusts, Canadian Dental Association, 1815 Alta Vista Drive, Ottawa, Ont. K1G 3Y6.

Nominations should be kept in confidence until the final decision regarding awards has been made.

## OBITUARIES

**Albanese, A.L.:** Dr. Albanese graduated from the University of Toronto's dental faculty in 1952. He practised dentistry in Welland, Ontario. He died August 21, 1991.

**Atkinson, W.E.:** Dr. Atkinson graduated from the University of Dalhousie's dental faculty in 1967. He practised dentistry in Kitchener, Ontario. He died December 18, 1991.

**Fraser, R.J.:** Dr. Fraser graduated from McGill University's dental faculty in 1951. He practised dentistry in North Battleford, the Northwest Territories and Prince Albert. Dr. Fraser served as president of the College of Dental Surgeons of Saskatchewan. He died November 10, 1991.

**Gertz, S.:** Dr. Gertz graduated from Loma Linda University School of Dentistry in 1960.

**Haiden, J.A.:** Dr. Haiden graduated from the Chicago College of Dental Surgery in 1956. He practised dentistry in St. Paul, Minnesota from 1956 - 1961, Gary, Indiana 1961 - 1963, and Biggar, Saskatchewan until 1968. He died November 27, 1991.

**McAnulty, K.P.:** Dr. McAnulty graduated from McGill University's dental faculty in 1980. She practised dentistry in North Vancouver, British Columbia. Dr. McAnulty served as president of the B.C. Periodontics Society. She died October 12, 1991.

**Strelioff, M.G.:** Dr. Strelioff graduated from the University of Alberta's dental faculty in 1949. He practised dentistry in Canora, Saskatchewan from 1949 - 1958 and in Edmonton from 1961 to present. He died November 17, 1991.

### ERRATUM

In the November issue of the Journal (57:863-870, 1991) the list of authors published with the article entitled "Hepatitis & HIV: Prevalence of infection and changing attitudes toward infection control procedures in British Columbia" was incorrect. Dr. G.B. Gibson's name was inadvertently spelled "Gary C. Gibson" rather than Gary B. Gibson.

Also, Dr. Gibson's qualifications were omitted at the end of the article. They should have read, "Dr. Gary B. Gibson is the head of the department of dentistry, University Hospital, UBC Site, and an assistant professor with the faculty of dentistry at the University of British Columbia."

## CFDE/CDA Teaching Conference — A Call for Topics

The Canadian Fund for Dental Education (CFDE) and CDA are seeking suggestions on possible topics for future CFDE/CDA teaching conferences.

Interested individuals should submit their topic suggestions to the Association of Canadian Faculties of Dentistry (ACFD) central office (Suite 109, 1815 Alta Vista Drive, Ottawa, Ont. K1G 3Y6) prior to March 31.

Suggestions should be accompanied by a brief outline of the proposed topic and include the names of potential participants. Suitable topics will be considered by ACFD during the CDA Council on Education meeting in June, and a topic for the 1993 conference will be selected at that time.

Successful applicants will be notified of their topic's selection following the council meeting.





*Dr. Richard Rayman  
Willowdale, Ontario*



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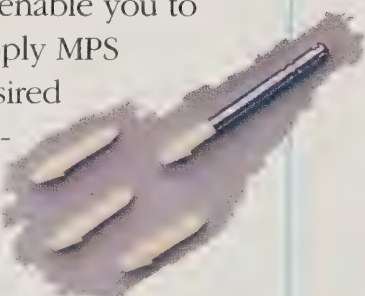
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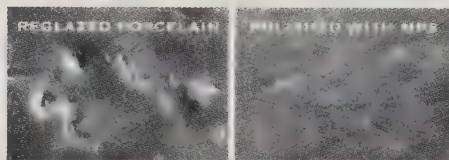
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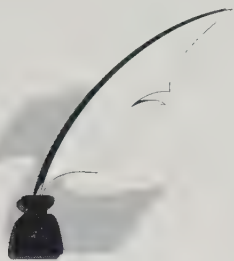
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# Letters/Courrier



## ■ CDAnet

As a dentist interested in computer programming, I recently sent for a copy of CDA's "Message Formats and Standards for Electronic Dental Claims." I noted that transmitting a single dental claim electronically necessitates the transmission of approximately 40 fields of data, including some 370 characters, before the details of treatment are even provided. Such information as subscriber identification number, relationship code, name of school (for a dependent), secondary carrier, spouse/significant other, birthday, etc., etc. must be compiled and updated by the dental office to ensure the validity of any transmission. If some of this information is incorrect, the network will return one or more of 61 error codes.

The question that begs to be asked is: Should it be the responsibility of the dental office to administer a large amount of information relating to the patient's insurance arrangements?

The current system has obviously been designed by the insurance carriers, with their own interests at heart. It doesn't surprise me that the latest issue of *ODA News* identifies only four offices in Toronto that are currently using CDAnet (**Editor's note:** In actual fact, there are 63 dental offices in the Toronto area linked to CDAnet).

I, for one, have no intention of participating in this system in its present form. I am interested in automating my practice, not turning it into a branch office of the local insurance company!

Henry Kutzko, DDS  
Toronto, Ontario.

## ■ CDAnet response

CDAnet is a system for the electronic submission of dental claims. The same basic information has to be sent whether claims are submitted on paper forms or electronically.

It is quite easy for the dental office to acquire the dental plan information, store this information in memory, and check at each future appointment to see if there have been any changes in the plan information. The stored informa-

tion is automatically retrieved from memory and does not have to be input at each visit.

CDAnet was designed by CDA's CDAnet committee, working with representatives of the dental plan carriers. Since the object was to duplicate the information contained on a paper claim form, electronic claims must have all the fields completed. Remember, the dental profession developed the standard dental claim form through discussions with the dental plans. The electronic data formats were based on the standard claim formats.

Dental software vendors in Canada have modified their software to collate and compress the data to be sent. Other advantages of the software modifications include an error checker, which makes it impossible to send a claim without the required data. For example; the date or a tooth number. You can sometimes omit these fields if you are filling out a paper claim form, resulting in the claim being returned to your office to be completed. This aspect of "self correction" improves the efficiency of the dental office.

CDAnet provides an efficient interphase with the dental plans. It greatly improves the speed of handling dental claims, and patients are pleased and impressed by the short turnaround time in receiving their cheques (three to five days on average).

Don MacFarlane  
Chairman, CDAnet committee

## ■ Help for Romania

I am asking for your help in a small gesture that may make a difference in the country of Romania. This country has been cut off from the academic world for more than a generation. Academicians and health professionals crave professional information – the *Journal of the Canadian Dental Association* is one of the most sought after publications among dentists in Romania.

My request is that you provide up to five subscriptions to the *Journal* to universities in Romania. There are currently five dental schools in Romania – in Bucharest, Cluj, Timisoara, Tirgu Mures, and Iasi.

We are working with a self-help organization, World Vision, to distribute journals. World Vision has an office in Bucharest and a regular delivery from an office in Pittsburgh, thus avoiding

Romanian mails. I hope you will join this growing effort.

David C. Johnsen, DDS, MS  
Department of Pediatric Dentistry  
Case Western Reserve University  
Cleveland, Ohio.

## Editor's Note

Arrangements have been made to send five *Journals* each month for distribution to Romanian dental schools.

## ■ Practice Management

I enjoy the "Practice Management & Success" columns written for the *Journal* by Imtiaz Manji. The monthly topics are always very thoroughly presented, and the concepts can be applied easily. We use each monthly subject as the basis for our staff meetings.

The combination of these management articles with historic, technical and scientific material makes the *CDA Journal* a really complete publication.

Paul M. Eisner, DDS  
Oakville, Ontario.

## ■ Amalgam Fees

I was interested in the article, "Dr. Gordon Christensen at the CDA Convention," published in the November 1991 issue of the *Journal*. I was present at the CDA lecture in Quebec, and also attended a similar lecture by Dr. Ron Jordan in Edmonton last November. Both of these prominent dentists presented the same theme – the fees for amalgams are too low.

At the outset, I thought to myself, "Surely this cannot be?" However, an analysis of my year-end reveals that whenever I do amalgams, I lose money. With a staff of four collectively earning about \$50 an hour, my total overhead is approximately \$250 per hour. If I complete four MOD amalgams within that hour, the fee (Alberta Dental Association fee guide) is \$190.

Six amalgams an hour will yield \$390, and a profit, but it's not very realistic. Particularly if the amalgams are difficult, in different quadrants or involve the new bonding techniques. And most certainly if one is expecting superior results. Nor will the alternative material, posterior composites, solve the dilemma – they are even more time consuming than amalgam.

I have to concur with Drs. Christensen and Jordan. Amalgam fees should be about two to three times what they are now. If I were a smart business executive, I would either deliver a more cost-effective product or charge what is



necessary to survive in the marketplace.  
*Kim W. Scott, DDS*  
*Medicine Hat, Alberta.*

### ■ Giving Science a Bad Name

I am writing in response to Dr. Mulrooney's letter in the August 1991 issue of the *CDA Journal* (57(8):617, 1991), "Giving Science a bad name." Dr. Mulrooney fails to see that placebo treatment is not non-treatment. He quotes Chesterton or Shaw as having written that "Science is the great superstition of the 20th century." Although not recognized as such by many "scientists," science is a branch of philosophy. Science is but an adherence to a methodology. The application of science is an educated guess. If solely relied on, it can be misleading if not impeccably and omnisciently applied. Two patients with the same apparent objective clinical presentation should not necessarily receive identical treatment. Health is largely a subjective experience. The superstition of science is the faith that it will provide us with answers to all of the intricacies of health and nature. It is the blind faith that "they," the experts, have all the answers.

With regards to placebos and psychosomatic factors: placebos work. There is evidence to support this. The brain and the immune system are intimately connected. A question to ask is: How and when is it appropriate to use placebo controls in scientific studies? "Good controlled studies" by no means give pure representations of whole therapeutic processes. The placebo is the physician who dwells within, whose action stimulates the release of endogenous agents that can have both therapeutic and even "toxic" effects. A small-minded clinician could be tempted to dismiss the placebo responder with a judgemental "it was just in their heads," as if to say that they were not afflicted with a "real" disease to begin with. For some, it is perhaps easier to trivialize or reject and overlook phenomena that don't fit into their known biological boxes. Dr. Mulrooney suggests: "All that has really been proven, however, is that non-treatment was as effective as the treatment employed, or, to put it another way, that the treatment provided was not effective." The first part of this sentence is relatively true (only relative to generously granting him that placebo treatment is non-treatment). The second part is not true at all. We don't simply treat teeth or joints, we treat whole humans.

So what is it that gives science a "bad

name"? Among other things, I believe that it is the myopic attitude of those who piously hide behind a veil of science, but when pressed, will reluctantly confess to "not having read all of the studies." Nobody has. It is the view that only through science can truth be revealed. That only that which has scientific support has credibility. And that if there is no scientific evidence to suggest

that the status quo is wrong, then the status quo must be right. This sort of smug arrogance is what gives science a bad name. An honest acknowledgement to self and to any of one's concerned patients as to the limitations of science and of the limitations to oneself is a healthy thing.

*Derek Bosch*  
*Calgary, Alberta*

## WHAT'S IT ?

This month's mystery is not a **What's It?** but a **"Where is it?"**

Below is an excerpt from a 1938 *Journal of the Canadian Dental Association* (JCDA, 4:1931, 1938):

### \*Dental Relics

The interesting dental cabinet pictured here, with its array of instruments, is the property of Dr. W.R. Parsons, of Winnipeg. It is on display at his office in the McIntyre Block. Any dentist visiting Winnipeg who would like to inspect this case will be made very welcome by Dr. Parsons.

The case is of old English rose wood, trimmed in brass, and it has been estimated that the set is anywhere from 125 to 200 years old. An old-fashioned turn key is attached to the inside of the cover. To the right of that is a hand drill made of ivory, with a swivel palm piece, while the other article on the lid is a separating saw. On the first tray, and part of the second, are 14 pearl handled instruments, furred with gold. The other instruments on the tray – tin foil pluggers, excavators, and burnishers – have ivory handles. A hand mirror, tin foil shears, and a mouth mirror, with carved pearl handles, set in coloured stones, are located in the centre of the tray. The forceps lying below the first tray are carved out of wood, as a model, and were obviously designed at a later date.

The following letter relating to the case of instruments was received by Dr. Parsons Nov. 12, 1927:

*Dear Sir,*

*Relative to the set of dental instruments given to you by the late Dr. R.A. Harvie, I would say that I do not think it possible for you to obtain any authentic history or information in connection with the said case of instruments.*

*My brother, J.S. Stalker, long in the employ of the late Dr. Harvie, says that the case of instruments was brought into this country from the Old Country by a Dr. Bone, one of the first dentists to practice in these parts and how, during the Riel uprising, the instruments were stolen and fell into the hands of some of Riel's followers. Dr. Bone sued the government for the recovery of same, and was compensated to the extent of several thousand dollars (\$3,000) I believe it was. Later, the instruments were recovered and in due course were returned to Dr. Bone, who at a later date presented the case to young Dr. Harvie, a fellow practitioner.*

*F.D. Stalker*

Historically, the "Dr. Bone" referred to in the above letter was Dr. Walter Robert Bown, the son of J.Y. Bown, a Member of Parliament for Brant, Ontario, from 1861-1873. Dr. Bown came to the Red River region in 1863 and was the first dentist to practice in what is now Manitoba. He became a friend of Dr. John C. Schultz, a physician who was very active in politics and who later became lieutenant governor of Manitoba.

If any *Journal* reader has knowledge of Dr. Bown, his instrument case, or Dr. W.R. Parsons and Mr. F.D. Stalker, please contact Dr. P. Ralph Crawford, Editor, *Journal of the Canadian Dental Association*.





# Practice Management & Success

## Keeping Your Practice Afloat in Your Absence

*Last month, readers were asked to consider allying themselves with other dentists to face the unprecedented challenges of practising dentistry in the '90s. This month, I will reveal how, by joining up with other dentists, you can benefit from an "insurance" plan that can't be found in the overflowing insurance company shopping cart.*

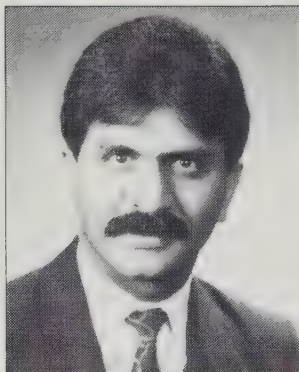
Accidents, illnesses, and even death can strike unpredictably, indiscriminately and very often uncontrollably. If you haven't given serious thought to what would happen to your practice if you became seriously ill, disabled or died suddenly, it's probably because you don't want to think about the unthinkable. None of us do. But as an unplanned 11-week absence from their practice would be enough to bankrupt most dentists, it is vitally important to ponder on that unthinkable.

I'm asking you to think beyond those important "conventional" preparations – disability and life insurance and wills – and get a little creative. I'm proposing an additional safeguard to the insurance protection you should already have in place.

What I'm advocating is already being done by some forward-looking dentists. Each of them has joined with 15 to 20 dentists in their area to devise a "practice continuation" plan. The concept is simple. If a member dentist is unable to work due to disability, illness or death, the other plan members ensure that his or her practice continues to function. By pooling their resources, these dentists offer one another a human "insurance" plan. The "premium" – donating time to an "unwell" practice on a rotating basis – is minuscule compared to the immense peace of mind gained by knowing that their practice will remain healthy in their absence.

### A Model to Follow

Dr. Kevin Cooke, a solo practitioner in Ontario, has already embraced the practice coverage plan, spurred on by the untimely death of a Hamilton colleague.



Imtiaz Manji  
B.Sc.  
President of  
ExperDent  
Consultants  
Inc.

"In September, 1990, I read the obituary in our local newspaper of a 48-year-old dentist," says Cooke. "He was a relatively young fellow who was diagnosed with an inoperable brain tumor. Within two or three months, he went from practising to dying. This really got me thinking about the practice coverage plan, a concept I had learned about at a U.S. workshop."

Cooke contacted his friend and colleague, Dr. Ron Giedraitis, and proposed that they form a practice coverage group. Giedraitis, who once had to scramble to have his practice covered when he underwent emergency back surgery, was enthusiastic.

Together, Cooke and Giedraitis began to search for dentists in their locality who shared similar practice philosophies. Within a short period they had formed a practice coverage group of 14 members.

The group's initial meetings were used to establish the ground rules and appoint a chairman. Here are the fundamental bylaws they implemented (which can be customized to suit an individual group's needs):

- 1) All participating dentists must be available on a week's notice to donate a day of their time to provide coverage for the practice in need.

- 2) Coverage for the affected practice is on a rotating basis, totalling a maximum of four days per week, with no single dentist donating more than two days per month of his time.

- 3) Coverage is limited to reasonable time constraints, up to a maximum of six months.

- 4) If coverage is required beyond the

one month mark, the plan chairman must call a group meeting with the stricken dentist (or a representative) to inform all members of the status of the dentist's disability or illness. For each additional month of coverage (up to the maximum of six months), the status of the affected dentist must be monitored and reported monthly.

- 5) At the end of the third month of the coverage, the number of days of coverage drops from four days per week to two. The reason behind the reduced coverage is that it provides an incentive for the stricken dentist to do one of the following: a) get back to work, if so able; b) secure a locum; c) find an associate to assume responsibility for the practice; d) arrange for some other practice transition.

### Details, Details

Once you have the big picture established, you need to get meticulous about the details.

Establish a rule governing the acceptance of new members and the tendering of resignations. Clearly, you want a reasonable delay period for resignations, such as 60 days, so that group members do not suddenly decide to shirk their responsibilities, leaving their colleagues in a bind.

Make certain that all group members are familiar with the "no stealing staff" rule outlined in last month's article. Not only should the member dentists be prohibited from hiring staff from the practice they are covering, they should be prohibited from "stealing" patients as well.

The scope of treatment to be provided by the visiting dentists is an issue that is likely to cause much debate in practice coverage groups, as it did with Cooke's group. He says there were lively discussions over this matter, with some members arguing that complex clinical procedures should not be done and others insisting that they should. At the end of the debate, logic prevailed.

Says Cooke: "As our purpose is to try to maintain a practice's viability, we agreed that we should try to operate as



closely as possible to the way the stricken dentist would have operated."

### More Fine-Tuning

Ensuring there is emergency office coverage to maintain your practice – the most important purpose of a practice coverage group – doesn't take care of all the fallout from a dentist's unforeseen absence. During that period, a myriad of issues will surface, from how to handle his or her payroll to what to tell patients when they ask about his or her condition. If these issues are dealt with in advance, it can significantly lessen the blow to the stricken practice.

Cooke's group has not only covered all the bases, they've gone that extra mile. Each member has a binder in his or her practice spelling out exactly how ancillary matters should be handled. This package even includes pre-written letters to the team, indicating their specific responsibilities and thanking them in advance for their dedication to the practice. The phone numbers and addresses of the practice coverage group's members, along with other important contacts such as lawyers, accountants and suppliers, are also listed so these people can be reached easily.

"Everyone in my practice knows where the binder is and knows what's in it," says Cooke. He underscores how important it is for the team to be guided on "what to say and what to do" in the various situations that could arise in his absence.

Without such guidance, the team could panic and become immobilized. And as Cooke rightly points out, the dentist's prolonged absence could quickly lead to a derailing of the practice.

"There are many young dentists who are financed to the hilt, who have expecting wives and who are the primary income source," he says. "Without a practice coverage plan, an accident, illness or death, could be totally devastating."

The hope, of course, is that the coverage group will never be "activated" and that the all-important binder will never have to be opened. But even if it simply rests on a shelf in your office collecting dust, its presence will bring an unparalleled peace of mind. And if it does have to be reached for some day, its colossal value will quickly unfold.

# The American Dental Association



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# The Dental Lab & You

## Clear-Flex

### The Unique Thermo-Elastic Acrylic Splint Material With a Memory

There are many alternatives available to the dental profession for the treatment of craniomandibular disorders such as TMJ, including orthopedic appliances, surgery, patient behavior modification and the formation of scar tissue within the joint by electrical or chemical methods.

However, many dental professionals are reluctant to make irreversible changes in condylar position without an initial trial phase of therapy. This reversible phase allows the practitioner to determine if the desired benefits will actually result, and if the mechanical aspects of the masticatory system are stable. Of all the currently available modes of therapy, orthopedic splints achieve the greatest control with the least expense and best reversibility.

#### A Versatile Treatment Alternative

Splints allow the dental professional to:

1. reproduce the mandibular rest position as a centric occlusion position.
2. provide a therapeutic occlusion in harmony with the neuromuscular patterns.
3. provide disclusion guidance which frees the masticatory system from noxious posterior interferences.
4. provide a masticatory machine which can apply maximum force with minimum self-destruction or pain.

Yet, until now, splints were typically constructed from a hard acrylic material that was subject to breakage and diffi-



Mr. H.J. (Hyo) Maier, RDT

cult to work with. Today, with Clear-Flex, there is a better way.

#### Clear-Flex - The Superior Splint

Clear-Flex is a unique thermo-elastic material that becomes flexible when placed under hot tap water. As the Clear-Flex splint cools, it returns to its original processed shape, conforming to the patient's teeth. In fact, Clear-Flex splints fit so well that chair-time is drastically reduced. Occlusal adjustments, if any, are done in the usual manner. And, when warm, the thermo-elastic properties provide greater comfort for the patient.

The Clear-Flex splint has such an accurate fit that the need for clasping for retention is practically eliminated. In

cases where there is no height of contour, ball clasps can easily be added on the linguals and buccals of the bicuspid and molars.

#### Patient Education and Cooperation Essential

As with any splint, patient education and cooperation are essential to a successful treatment. Splints are like casts. Although they may be necessary for healing, they are a constant nuisance for most patients. Unless the patient truly wants healing to occur, the splint will not be worn continually.

Objective, accurate education is appropriate in all splint cases. Splints are sometimes visible and conspicuous. They usually create a speech impediment, for at least a few days. Eating is difficult with a splint. Diet must be modified. And, wearing a splint often means multiple visits to the dentist while the joint and associated structures are healing. Acceptance of this type of "hassle" must be based on the patient's perceived needs if the therapy is to continue for the usual three to six months required in most cases. When the patient clearly sees that wearing the splint is the best way to avoid a dental problem (even more undesirable than the splint), the splint will be worn.

Clear-Flex splints. Ask your laboratory about them today.

Mr. H.J. (Hyo) Maier, RDT, is president of Aurum Ceramic/Classic Dental Laboratories Ltd.



Fig. 1: Full occlusal splint



Fig. 2: Partial splint



Fig. 3: Ball clasp retention





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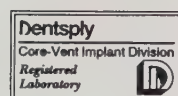
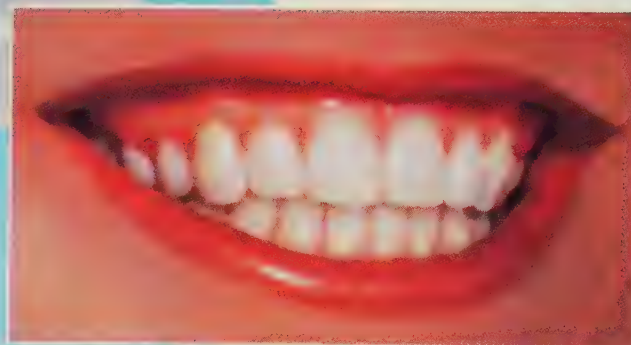
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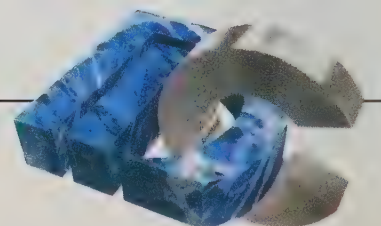
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# The DAP Advisor

*The DAP Advisor offers information, ideas and advice to improve dentist/patient communication, raise awareness about good dental health, and help your practice become busier.*

## Making the Most of the Mail

This is the age of high-tech communication, of fax machines and cellular phones. And yet, for all the flash and speed of these technological wonders, there are still some old-fangled, but nonetheless useful vehicles of communication that we shouldn't overlook.

Consider the mail for example. This decidedly low-tech form of communication conveys bills, statements and recall cards to your patients. True, using the mail can be very expensive, what with postage, stationery and the cost of putting it all together, but it's a necessary expense that helps you stay in business. And the mail offers you the unique opportunity to reach directly into your patients' homes. It is a conduit through which you can transport a wide variety of timely and compelling communications.

There are a number of very good reasons to use the mail. It can help you build rapport with your patients by demonstrating your concern about their dental health. It's an excellent way to provide them with educational information which, as a recent poll has shown, they look to you first to provide. And, if you are already sending out bills and statements, using the mail to distribute educational or promotional material allows you to make the most of something you are already paying for.

Here are a few tips that will help you get greater value out of your mailings:

- *Stuff that envelope:* Include a brochure, a fact sheet, your practice's newsletter – or any other piece of educational material you think your patient might find useful – with those statements or bills.
- *Refine your recall message:* If you use recall cards to remind patients that it's time to book their next appointment – either in conjunction with the telephone or alone – you might want to consider what they say. For example, do your cards tell patients why they need to see you? If you refresh a patient's memory about the reason for a scheduled visit, by sending out an appropriate recall card, you might well reduce his or her inclination to cancel or delay an appointment.
- *Special Delivery:* Even if you don't make regular use of the mail, there are times when you may want to use it to draw your patients' attention to certain compelling issues. For example, during the anti-capitation campaign a couple of years ago, many dentists sent their patients letters or articles on how capitation might negatively affect the quality of their dental care. Special mailings can inform your patients on various issues and help bring them on side. They can also be used to alert patients to interesting and pertinent dental health articles in newspapers and magazines.
- *Soften the Bill, Please:* A 1988 Gallup poll showed that only 20 per cent of respondents found dental costs reasonable. If you use the mail to send statements to your patients, you can help make the bottom line seem more reasonable by listing the dental services you've provided and explaining the benefits (immediate and/or long term) of receiving these services. That way, your patients can see exactly what they're paying for, and why, which might give them a better understanding of the good value they're getting for their money.
- *The Thought Counts:* It never hurts to show your patients that you care about them as people. The mail is an appropriate and effective way to do that. For example, there are a number of reasons to send your patients a card: the birth of a child, a birthday, to offer condolences on a loss. You might even want to send a welcome card to a new patient, and a thank you card to the patient who referred that individual to you. Remember not to overdo it, or this concern could look an awful lot like self-promotion.



*The DAP Advisor is a service of CDA's Dental Awareness Program, an ongoing campaign dedicated to helping all Canadians keep their teeth Good For Life.*

*\* Back by popular demand. This DAP Advisor was first published in March 1990 CDA Journal.*



# Let's Talk

## Premium increases, insurance agents and brokers

Our recent mailing regarding the premium increases in some Canadian Dentists' Insurance Program (CDIP) plans has sparked a flurry of letters from various insurance agents and brokers across Canada. These letters, directed at dentists, all have the same central theme – each agent or broker proclaims that they can serve you better and save you money.

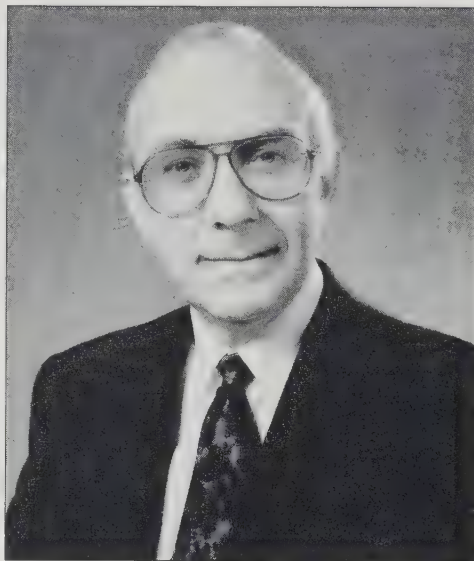
As president of Canadian Dental Service Plans Inc. (CDSPI), I urge you to read the claims being made by these agent/brokers very carefully. Remember, these people are often unknown to you, and they are asking you to abandon some of the protection you have known through CDIP in favor of their proposals. Your insurance coverage is too important to your overall financial planning for you to make a decision on your future coverage in haste.

And although no one can deny any professional agent or broker the right to increase his or her sales, especially in this time of recession, we believe that we're being fair in asking you to make your insurance decisions based on your experience with CDIP.

It is important to remember that until 1992, CDIP's long-term disability (LTD) and office overhead expense (OOE) premiums had not increased in 14 years. It would be difficult to name any product or service that has not doubled, tripled, or even quadrupled in price within the same period.

Equally important, some agents only represent one insurance company, which may not offer the most appropriate policies or the lowest rates in certain situations. And if this is the case, the agent/broker may not understand the specific insurance needs of dentists.

As I stated in my recent letter, which you received with your invoice for the insurance coverage being offered to you through CDIP, when business is at an all-time low, many things are said and done in order to earn a commission on insurance premiums. I know, because I have heard some of these things and they concern me. That concern leads me



*Dr. Mel Charendoff, DDS, MS, FRCD  
President, CDSPI*

to offer a few words of caution. If you decide to shop the market and plan to discuss your insurance needs with an agent/broker, make sure that you ask all the right questions. That is the only way to ensure that you buy into a program that meets your needs.

Here are a few suggestions for choosing an agent/broker:

**1) Experience:** Look for someone with a minimum of two years experience in dealing with the professional market – specifically their experience in dealing with dentists.

**2) Referrals:** Ask the agent/broker for any referrals they may have from other dentists and check them out.

**3) Sales Volume:** Many agent/brokers feel you should be impressed because they are members of the elite "Million Dollar Club." Be more concerned about how well they have served their clients, not by how much insurance they have sold.

**4) Conflict of Interest:** Never lose sight of the fact that an agent/broker makes commissions relative to the type and amount of insurance he or she sells. A good agent/broker knows that long-term success is best achieved by selling you only the insurance you need. If you have any doubts about the agent/bro-

ker, or if you believe a possible conflict of interest exists, he or she is not the agent/broker for you.

### Knowledge of CDIP

Some agent/brokers criticize CDIP, claiming the program is inferior. In trying to compete, they make incorrect statements about its benefits and features. These people are misinformed and may be misleading you out of ignorance. Ask the agent/broker if he or she is on the mailing list to receive information about CDIP. If not, urge the individual to contact CDSPI. We will be pleased to provide him or her with the facts.

Remember, your own CDIP is capable of handling most of your insurance needs – as it has for Canada's dental profession for 32 years.

If you have any questions or concerns, call CDSPI – your service organization. We're here for you.

*Let's Talk is an open letter to dentists from Dr. Mel Charendoff, the president of CDSPI.*

**CDSPI**  
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# 1992 Calgary Convention • August 29 - September 2

## CONVENTION UPDATE

### CDA Corrals a Great Convention for the Whole Dental Community



I would like to issue an invitation to all Dental Assistants in Canada to consider attending the CDA Convention in Calgary, Alberta from August 29 to September 2, 1992.

There will be so many events to attract people to our beautiful Foothills City. Of course you can expect a rodeo and western dancing, a chance to wear a stetson, entertainment at opening ceremonies and the fellowship of Dental Assistants from all over the country. A special event will be an

Awards Banquet which will be limited attendance for those who register early.

The Scientific content of the Convention should tempt any D.A. to update on any subject possible in Dentistry. Some of the topics will include:

- Working with Difficult People
- Stress in the Dental Office
- Introduction to Home Computers
- Practice Management
- Periodontics, Endodontics
- Nutrition and Health
- Office Emergencies and Electric Dental Anesthesia
- New Technologies
- Oral Surgery
- Laser Technology
- Dental Materials and the Amalgam Controversy
- Oral Pathology, Oral Radiography, Pharmacology
- Prosthodontics

The Convention promises to be an action packed event with a Fun Run, lots of social activity and a great educational portion.

I look forward to welcoming you to Calgary on behalf of the Canadian Dental Assistants Association.

*Barb Peterson*

*C.D.A.A. Representative to the CDA Convention*



Come and join your colleagues at the 1992 CDA Convention in Calgary, August 29 – September 2! Calgary's attraction lies in the contrast of a modern vibrant city with a backdrop of breathtaking mountain scenery. The warm hospitality and natural beauty of Calgary make this city the perfect location for a CDA Convention that delegates can't help but enjoy.

The upcoming convention promises to be a great continuing education opportunity for all dental team members. The scientific program boasts renowned speakers who will provide the most up-to-date information on a broad spectrum of topics. Lectures on recall program effectiveness, infection control, pharmacology and human behaviour will be of particular interest to dental hygienists. A professional development component will also be included in the dental hygiene program. Don't miss this opportunity to meet with colleagues and exchange ideas on pertinent issues. All dental hygienists are invited to attend and take advantage of the special program we will be offering to our members.

The convention schedule is filled with exciting social and informative activities. Look for more detailed program information in future convention updates. Come and experience Calgary's energy and enthusiasm at your next CDA convention.

*Kathy Gernhard*

*Dental Hygiene Representative to the CDA Convention*

**Clip and mail this coupon to CDA Conventions – 1992, 1815 Alta Vista Drive, Ottawa, ON K1G 3Y6**

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# 1992 CDA Annual Convention

## Calgary • August 29 – September 2, 1992

### Limited attendance pre-convention courses



Saturday, August 29

**Jennifer de St. Georges**  
Monte Sereno, California

#### **"Handling Key Time Management Problems"**

Time management is the key to a successful practice. By popular request, Jennifer is presenting the portion of her scheduling seminar relating to handling key scheduling concerns. Attendees will leave this seminar with the confidence to handle scheduling problems with patients in a highly effective, caring yet professional manner. In this presentation Jennifer will review the Nine Golden Rules for handling office emergencies and 24 benefits of a five-minute morning meeting ... the key for your stress free day.

#### **"Taking the Risk out of Risk Taking"**

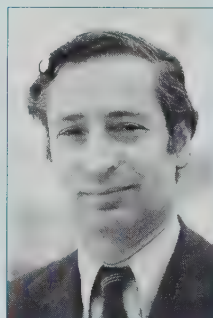
In the afternoon, Jennifer will present participants with a prescription for tomorrow's practice. Today's patient seeks out a practice that will give them quality of care, as they perceive it and service as they envision it. Confidence in oneself, diagnosis, treatment and positive results are the foundation of a successful practitioner but fear of change, not having vision and focus can limit one's growth. Taking even the wrong action can often be more positive and effective than no action at all. This seminar will give you food for thought and practical tools to move the dental practice to the next level of management. Learn how other practices are successfully getting away from taking responsibility for patient's problems.

##### *About the clinician:*

Jennifer M. de St. Georges is an internationally renowned dental management educator who has spoken at virtually all the top meetings and universities around the continent. She has been in dentistry since 1965 and on the lecture circuit since 1972 and has developed a solid reputation for providing the "nuts and bolts" of management in a highly motivating, practical, yet entertaining manner. Her audiences find her use of verbal skills and focus on implementation to be extremely effective.

Jennifer is on the editorial board of Dental Teamwork. She and her husband, Dr. David Tom, manage their International Management Centre in Los Gatos, California, 50 miles south of San Francisco.

**Registration forms and  
Hotel Registration forms for the  
1992 CDA Annual Convention  
(Calgary, Alberta) will be available  
in the March 1992 issue  
of the CDA Journal.**



Saturday, August 29

**Howard Martin, DMD**  
Silver Spring, Maryland

#### **"High Tech Root Canal – Flare, File, Fill"**

Hands-on – Limited Attendance

Sponsored by

**Caulk Canada**  
**Dentsply**

This hands-on participation course will increase your clinical experience in technological advances to quickly improve your success and do more endodontics with ease, effectiveness and efficiency.

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An ultrasonic biotechnological root canal preparation that will easily, rapidly and effectively debride, irrigate, disinfect and shape the root canal – all in minutes
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The warm lateral condensation technique with the battery powered, heat controlled spreader/plugger – ENDOTEC, completely seals the canal in minutes with total control, no special gutta percha, no alteration of normal lateral condensation and no change in canal preparation.
- **CONTROL SAFE END K/H FILE & HANDLE** to avoid slippage, glove roll and for safe and controlled canal preparation
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- **2 in 1 ENDO ACCESS BUR** for penetration and opening
- **CURVED CANAL MANAGEMENT**
- **ONE APPOINTMENT ENDODONTICS**

##### *About the clinician:*

Dr. Howard Martin received his D.M.D. degree from Tufts University School of Dental Medicine and Post Graduate from the University of Pittsburgh, Graduate School of Dentistry. Since 1984 Dr. Martin has been the Research Endodontist at the V.A. Medical Center, Washington, D.C. Formerly Clinical Associate Professor, Georgetown University, private practice Silver Spring, Maryland. Diplomate, American Board of Endodontics; Fellow, American College of Dentists; Guest Scientist, Naval Dental School; Consultant, Walter Reed Army Medical Center, contributor to four endodontic textbooks, author of 25 research papers, holder of 15 chemical/dental patents, has lectured nationally and internationally. Dr. Martin is the developer of the CAVIENDO, ENDOTEC, M SERIES ROOT CANAL INSTRUMENTS, and CONTROL SAFE END FILE/HEDSTROM & HANDLE.



# 1992 CDA Annual Convention

## Calgary • August 29 – September 2, 1992

### Limited attendance pre-convention courses



Saturday, August 29  
Sunday, August 30

Jay R. Friedman, DDS  
Los Angeles, California

Gary R. O'Brien, DDS  
Los Angeles, California



Sunday, August 30

Terry Donovan, DDS  
Los Angeles, California

#### "Surgical and Prosthetic Implants"

Hands-on – Limited Attendance

Sponsored by

## Dentsply

Core-Vent Implant Division

The science of implant dentistry is moving at a rate faster than the publications are able to inform the implant surgeon. Information necessary to assure the implant specialist that the highest level of care is being provided in the practice can only be received through continuing education courses. This course will concentrate on the current knowledge and information relating to the surgical placement of cylindrical endosseous fixtures.

Topics included:

- How can we alter surgical protocol and implant selection to achieve 97% to 99% success in our practice?
- What variables are involved in long term success maintenance of these fixtures?
- What is HA?
- Is HA the panacea for implant dentistry?
- What clinical evidence do we have to prove or disprove these theories?
- What are the "nuts and bolts" of implant dentistry?

Due to the increased predictability of osseointegrated dental implants, practitioners are incorporating them into their treatment on a routine basis. The afternoon session, to be delivered by Dr. Jay Friedman, will review restorative implant dentistry through the use of different implant components. Evaluation and treatment planning procedures for single tooth, partially edentulous and completely edentulous patients will be discussed. Fabrication of stents will be shown. The methods of connection between natural teeth and implants, if needed, will be reviewed. Sequencing of surgical and restorative procedures and communication with the surgeon and dental technician will be suggested. Clinical examples from impression procedures to delivery of dental implant restoration procedures will be presented.

The second day of this course will feature surgical and prosthetic hands-on training. The surgical hands-on session will insure the understanding of the surgical principles of Dentsply's Spectra-system of Osseointegrated Implants. Participants will place various implants in specially designed models using various techniques and instrumentation. Surgical manuals will be provided. During the prosthetic hands-on training, the clinicians will demonstrate the advantages and alternate treatment modalities of all the various implant restorative options for partially and fully edentulous cases. Participants will be introduced to prosthetic components and will participate in taking impressions. Prosthetic manuals will be provided.

#### "Esthetic Restorative Dentistry and Materials Update"

Today's practicing dentist has the finest materials and techniques ever available for producing excellent restorative dentistry. However, many of the new materials are technique sensitive and must be used in a very specific manner to achieve clinical success. This course will review the advances in restorative materials in the past few years and present the techniques essential to produce consistent esthetic and functional restorative dentistry.

Topics to be covered include:

- Essentials for soft tissue esthetics on fixed prosthodontics;
- Effective gingival displacement;
- New materials and techniques for fabrication of provisionals;
- Review of impression materials;
- New impression techniques;
- Solutions for fractured porcelain: metal bonding - mystery & myth;
- Current thoughts on bonding to tooth structure;
- Conservative esthetic techniques: bleaching, enamel microabrasion;
- Bonded porcelain: veneers, inlays/onlays, use in oral rehabilitation;
- Other current topics.

#### About the clinician:

Dr. Terry Donovan received his D.D.S. degree from the University of Alberta, Canada in 1967. He is currently Associate Professor and Director of Restorative Research and Chairman of the Section of Biomaterials Science at the University of Southern California, School of Dentistry. He received his certificate in Advanced Prosthodontics from U.S.C. in 1981. Dr. Donovan has recently been selected as Chairman for the Council on Dental Materials; Instruments and Equipment for the American Dental Association. He is also a member of the California Dental Association, the American Academy of Restorative Dentistry, CAIC, and the Pacific Coast Society of Prosthodontics. He is the author of numerous publications and has lectured extensively on the subjects

#### About the clinicians:

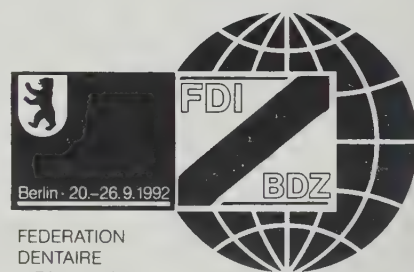
Dr. Jay Friedman received his DDS at the State University of New York and a certificate in Prosthodontics from the University of Southern California. In 1984 he became an associate of Dr. Niznick. Today he provides Restorative Prosthodontic services for the Core-Vent Implant Institute. Dr. Friedman is a member of the American College of Prosthodontics and a clinical instructor in the Department of Restorative Dentistry at the University of Southern California.

Dr. Gary O'Brien received his DDS with honors from the University of Southern California, School of Dentistry and was the recipient of nine letters and awards of commendation. He now teaches at the Department of Prosthodontics and Operative Dentistry at USC and maintains a private practice at the Core-Vent Implant Institute in Los Angeles. Dr. O'Brien has been involved with implant research since 1977.





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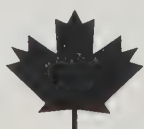
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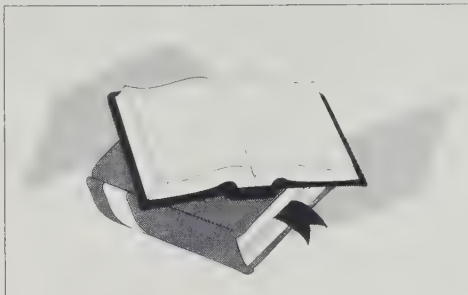


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# Book Reviews

## MICROSURGICAL TISSUE TRANSPLANTATION

Edited by D. Riediger, M. Ehrenfeld

1989, Quintessence Publishing Co., Inc., 243 pages, \$48 (U.S.)

The broad spectrum of microsurgical techniques in use today has opened many avenues of approach to both simple and complex reconstructive surgery. In November 1987, the University of Tübingen, in the Federal Republic of Germany, hosted an international symposium on "Microsurgical Tissue Transplantation." Papers presented at this symposium are compiled in this 243-page volume.

The 34 manuscripts are divided into five parts, including sections on microsurgery of the head and neck, oropharynx and trunk and extremities, as well as basic research and microneural sections. In general, the papers reflect basic techniques applied to a variety of requirements after trauma, oncologic surgery and developmental afflictions, and are supported by good-quality photographs and diagrams. A case report format predominates and basic knowledge of microsurgical procedures and gross anatomy is presumed. Step-by-step instructions are not presented.

Of particular interest to oral and maxillofacial surgeons and dentists are several papers delineating the microvascular supported free tissue transfers of distant tissues to the head and neck.

Standard myocutaneous and osteomyocutaneous grafts are well represented, as are free fat tissue grafts and free omentum and small bowel transfer for mucosal reconstruction.

Technical anatomic and long-term considerations for extra temporal facial nerve defects and inferior alveolar nerve microneural surgery are augmented by annotations on research areas of clinical importance, such as nerve sutures under tension and vascularized nerve grafts.

This volume provides material of interest and clinical application, produced by surgeons with extensive experience, and provides adjunctive information for oral and maxillofacial surgeons with basic microsurgery training.

Reviewed by:  
R. G. Stapleford, DDS, FRCD(C)

## THE ECG IN ANESTHESIA AND CRITICAL CARE

Edited by Daniel M. Thys and Joel A. Kaplan

1987, Churchill Livingstone Inc., New York, N.Y.  
267 pages, B & W illustrations, \$33.95

This soft-cover book presents the contributions of some 17 authors from all aspects of medicine. Each one is involved either directly or indirectly in cardiac monitoring and patient care. With ECG monitoring becoming "the community standard" in settings where parenteral sedation or general anesthesia is given – including the general dental office, or the oral and maxillofacial surgeon's office – the practitioner is always looking for help on ECG interpretation.

This book is divided into 16 chapters and an index. The body of the text is referenced directly, with each chapter being followed by an extensive bibliography.

While the authors state that they have not assumed any previous knowledge of electrocardiography on the reader's part, a sound background in this area would certainly help. This is not what one could call a basic instruction manual.

The initial chapters review both the fundamental principles of electrocardiography as well as the basic electrophysiology of the heart at the cellular and ionic level. The electrophysiologic effects of anesthetic drugs are discussed in a separate chapter and re-emphasized throughout the book.

A second area of major emphasis is on the detection of myocardial ischemia, injury and infarction. There are also very useful guides for the easy modification of the standard 3-lead ECG found in most outpatient settings to a simple system that will monitor lead 2 for rhythm changes and a modified lead V<sub>5</sub> to detect ischemia.

The remaining chapters thoroughly review subjects such as electrolyte disturbances, pediatrics, and post-cardiac surgery ECG changes. There is also an excellent chapter on pacemakers and their influence on total patient care. This book approaches electrocardiography from the viewpoint of the anesthesia care provider, and addresses the specific problems found, both preoperatively and during the perioperative monitor-

ing period. It undoubtedly contains many more facts and details than would be required in the outpatient setting; however, it expands the practitioner's appreciation for the entire scope of the subject. This book is an excellent overall educational review of the ECG in anesthesia, and would make an excellent addition to the library of any health care worker involved in ECG interpretation. While the actual order in which the chapters are presented may raise some eyebrows, this hardly detracts from the overall content of the book.

Reviewed by:

Earle R. Young, B.Sc., DDS, B.Sc.D., M.Sc., FADSA, acting head, department of anesthesia, faculty of dentistry, University of Toronto and the Wellesley Hospital.

## TRAUMA ANESTHESIA

Edited by: John K. Stene, Christopher M. Grande

1991, Williams and Wilkins, Baltimore, Md.

One may wonder why a book review on the treatment of the trauma patient from an anesthesia standpoint has found its way into a dental journal. A review of the titles of the text's 18 chapters will provide a quick explanation.

This is a first-edition, hard-cover book containing over 500 pages. It brings together the work of over 20 contributors from all areas of medicine, is extremely well-written, and has very few typographical errors. The body of the text is directly referenced, with extensive bibliographies appearing at the end of each chapter. For the most part, the references are very up-to-date, and the book concludes with an extremely complete index.

Basically, this book is divided – albeit in an indirect way – into four fascinating themes that should be of interest to the dental practitioner. The first two chapters discuss the mechanisms or etiologies of trauma. This is extremely useful reading for the practitioner involved in treating trauma victims, and in particular, for the oral and maxillofacial surgeon. A clear illustration is provided of how the physics of trauma may lead to distant and otherwise unsuspected injury.

The second major area of emphasis is on the general principles of patient resuscitation. Logically, this leads into



the third and fourth major themes of the book, namely, a firm understanding of basic human physiology and an in-depth "appreciation" of the principles of airway management. Underlying these four major areas of emphasis are chapters on the specific body systems that may be involved in trauma, as well as specific concerns for the burn patient, the pregnant trauma patient, and the pediatric trauma victim. There are specific chapters on hyperbaric medicine, oral and maxillofacial trauma, patient transport and occupational hazards for health care workers, especially those involved in the treatment of trauma victims.

As with almost any comprehensive text written in the United States these days, there is a chapter on legal and

ethical issues. The book's rather extensive forward and preface, which precede the major body of the text, emphasize the contributors' general opinion, which prevails throughout the text, that trauma anesthesia should be a subspecialty of general anesthesia practice.

This is an impressive and very unique text that would give any health care provider a firm understanding of basic patient care, with emphasis on the patient who has been the victim of trauma. It would have been even more complete, if at least one of the contributors had a dental background, however.

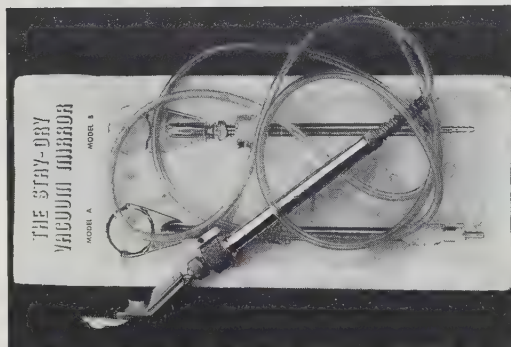
*Reviewed by:*

*Earle R. Young, B.Sc., DDS, B.Sc.D., M.Sc., FADSA, acting head, department of anesthesia, faculty of dentistry, University of Toronto and the Wellesley Hospital.*

## "WHAT'S IT" ANSWER – NOVEMBER QUESTION

In November, readers were asked to contact the *Journal* if they knew how the mirror depicted in this photograph worked. Although we received no direct answers, the *Journal* did come across a pamphlet (undated) that helped solve the mystery.

The mirror was manufactured by the "Stay-Dry Vacuum Mirror Co." of La Salle, Illinois. The company's description of the product, contained in a pamphlet accompanying the mirror, states: "Utilization of Vacuum – By employing a vacuum created according to Venturi's principle as an aid, a mirror has been made which stays dry and effective. A simple mechanism is housed in a plenum



to which the mirror is attached. The vacuum formed by (the action of) compressed air leaving a venturi is used to obtain a dry mirror and activate other physical principles in a way to maintain a dry surface under the most difficult conditions."

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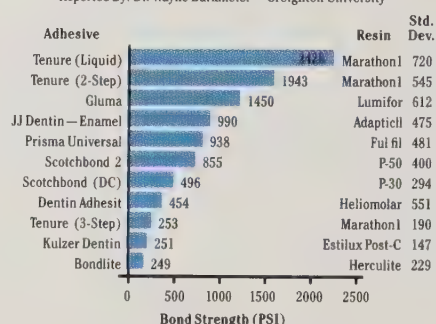
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Reported By: Dr. Wayne Barkmeier — Creighton University



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# Specialty Feature

## Comprehensive Dental Care for Children with Bleeding Disorders — A Dentist's Perspective

J.H. Ublansky, DDS, Dip. (Pedo.)

### ABSTRACT

Providing treatment to pediatric patients with bleeding disorders can present a challenge for the dentist. In the past, this group of patients may have avoided regular dental care, attending the dentist only in acute situations requiring immediate attention. Today, with the recent advances in medical management, patients with bleeding disorders can undergo comprehensive dental care. However, the dentist must have an understanding of the patient's specific coagulation defect, and use a team approach with the patient's physician and hematologist prior to undertaking any treatment. This paper reviews the key aspects of patient assessment and provides specific management protocols for all phases of dental treatment. Supported by a strong preventive program, the use of indicated replacement therapy where necessary, conservative treatment approaches, and the use of local hemostatic measures to control hemorrhage, most cases can be successfully managed. Thus, a valuable and once neglected service can be delivered in a safe and thorough manner.

toutes les étapes des traitements dentaires qu'on peut leur donner. Dans la plupart des cas, on a toutes les chances de réussir lorsqu'on s'appuie sur un bon programme de prévention, qu'on a recours à des traitements substitutifs s'il y a lieu, qu'on adopte une approche prudente et qu'on administre des homostatiques locaux en cas d'hémorragie. Au lieu de négliger les enfants hémophiles comme autrefois, on peut maintenant leur offrir de précieux services en toute sûreté.

### Introduction

An understanding by the treating dentist of the major bleeding disorders encountered in children, and recent advances in medical management, will greatly assist in the provision of comprehensive care for the pediatric dental patient. Whereas, in the past, the neglect of the dentition was a common occurrence among these patients, today all phases of dentistry may be provided to them as long as accepted protocols are adhered to. This article will attempt to outline the key aspects of patient

assessment and provide specific management protocols related to treatment planning.

### Patient Evaluation

The taking of an accurate history is very important in the diagnosis of a bleeding disorder. In the case of a moderate or severe congenital defect, there will probably have been several bleeding episodes already. Moreover, it is possible for children to have acquired hemorrhagic disease or reach maturity with congenital disorders without these conditions being detected, due to their mildness. An interview must, therefore, be conducted with these possibilities in mind. The medical history should include descriptions of all operations, injuries, and previous bleeding episodes (including those from extracted or exfoliated teeth).<sup>1</sup> Inquiries should also be made about nosebleeds and hemorrhage from other mucosal surfaces. Specifically, female patients should be asked about unusually profuse menses or any recent change in their severity.<sup>2</sup>

A family history of bleeding problems is also of importance, and where

### SOMMAIRE

Pour le dentiste, donner des soins à des enfants qui sont sujets aux hémorragies pose un défi. Autrefois, ces enfants ne rendaient pas toujours régulièrement visite au dentiste, faisant appel à ses services seulement lorsqu'ils avaient des maux de dents aigus. Aujourd'hui, grâce aux progrès de la médecine, ils peuvent obtenir tous les soins dentaires dont ils ont besoin. Le dentiste doit cependant connaître la nature exacte de la maladie dont souffre chaque enfant hémophile et, avant de le traiter, se concerter avec le médecin et l'hématologue qui le soignent.

Dans cet article, on passe en revue les principaux points dont il faut tenir compte pour juger l'état de ces patients et on suggère des protocoles précis pour

### Table I

#### Personal History of Bleeding Manifestations

| Clinical Features*                        | Primary Hemostasis (Platelet Disorder) | Secondary Hemostasis (Coagulation Disorder) |
|-------------------------------------------|----------------------------------------|---------------------------------------------|
| Petechiae                                 | Yes                                    | No                                          |
| Hemarthroses                              | No                                     | Yes                                         |
| Ecchymoses, hematomas                     | Yes                                    | Yes                                         |
| Onset of bleeding after trauma or surgery | Immediate                              | Delayed                                     |
| Mucous membrane bleeding                  | Spontaneous                            | With trauma or disease                      |

\* The clinical features are generalizations rather than unique characteristics of primary and secondary hemostasis.



Table II

## Screening Laboratory Tests in Selected Hemostatic Disorders

| Clinical Bleeding | aPTT     | PT       | TCT      | Bleeding Time | Platelet Count | Possible Defects                                                                  |
|-------------------|----------|----------|----------|---------------|----------------|-----------------------------------------------------------------------------------|
| Absent            | Abnormal | Normal   | Normal   | Normal        | Normal         | High-molecular-weight kininogen, prekallikrein, Factor XII, lupus inhibitor       |
| Present           | Abnormal | Normal   | Normal   | Normal        | Normal         | XI, IX, VIII*                                                                     |
| Present           | Abnormal | Abnormal | Normal   | Normal        | Normal         | V, X, II, coumarin, vitamin K deficiency, mild hepatic disease                    |
| Present           | Normal   | Abnormal | Normal   | Normal        | Normal         | VII                                                                               |
| Present           | Abnormal | Normal   | Normal   | Abnormal      | Normal         | von Willebrand disease <sup>§</sup>                                               |
| Present           | Abnormal | Abnormal | Abnormal | Abnormal      | Normal         | Afrinogenemia <sup>◇</sup>                                                        |
| Present           | Normal   | Normal   | Normal   | Abnormal      | Abnormal       | Thrombocytopenia                                                                  |
| Present           | Normal   | Normal   | Normal   | Abnormal      | Normal         | Qualitative platelet disorder (aspirin, thrombasthenia, Bernard-Soulier syndrome) |
| Present           | Normal   | Normal   | Normal   | Normal        | Normal         | Factor XIII (see Bleeding Disorders With Normal Screening Tests)                  |
| Present           | Abnormal | Abnormal | Abnormal | Abnormal      | Abnormal       | Disseminated intravascular coagulation, severe liver disease                      |
| Variable          | Normal   | Normal   | Abnormal | Normal        | Normal         | Dysfibrinogenemia, myeloma, fibrinogen/fibrin degradation products                |
| Present           | Abnormal | Normal   | Abnormal | Normal        | Normal         | Heparin <sup>§</sup>                                                              |

\* Also compatible with deficiency of the putative Passovoy factor

§ Variable aPTT and bleeding time

◇ May have a normal bleeding time

§ High plasma concentration associated with a long prothrombin time

positive, requires further investigation and explanation. A referral to a geneticist can be initiated if appropriate. Finally, a list of current medications should be noted. Aspirin, for example, may lead to prolonged bleeding should an emergency extraction be indicated.

Depending on the data received during the history taking, a physical evaluation may also be indicated. The clinical features of bleeding disorders can assist in the differential diagnosis of platelet disorders versus coagulation defects (Table I).

Oral trauma is often the reason for a child's first dental visit. A significant number of cases of mild hemophilia have been discovered from an episode of oral bleeding.<sup>3</sup> Thus, the diagnosis of the condition may involve the dentist directly. If a hemorrhagic disorder is suspected, the dentist must refer the patient to the appropriate medical personnel for further evaluation.

Table III

## Bleeding Disorders with Normal Screening Tests

|                                       |
|---------------------------------------|
| Simple purpura                        |
| Senile purpura                        |
| Factor XIII deficiency                |
| Alpha 2 Antiplasmin deficiency        |
| Mild clotting factor deficiency       |
| Amyloidosis                           |
| Vascular disorders                    |
| Hereditary hemorrhagic telangiectasia |
| Scurvy                                |
| Ehlers-Danlos syndrome (?)            |
| Henoch-Schonlein purpura              |
| Von Willebrand disease                |



Laboratory testing is indicated to confirm a diagnosis, although in some cases such as von Willebrand's disease, it may not be conclusive.<sup>1</sup> **Tables II and III** provide an evaluation of the findings obtained in blood screening tests.

Once a suspected bleeding disorder is diagnosed, a decision must be made as to whether the required dental treatment can be managed in the private office. If the dental practitioner is not comfortable with this situation, referral to a specialist or a hospital-based dental department may be prudent.

## Preventive Dentistry

A strong program of preventive dentistry is paramount in providing care to the child patient with a bleeding disorder.<sup>4</sup> The dentist and dental hygienist must, for the most part, assume this responsibility with the assistance of the parents, especially for the younger child. Regardless of the severity of the disorder, brushing and flossing should not be discouraged, even if gingival bleeding is feared, since no significant hemorrhage will result if the brushing and flossing are performed properly. The preventive program should educate both the patient and the parents about diet and the benefits of systemic and topical fluorides. Early and frequent examinations will be beneficial in avoiding problems such as nursing bottle syndrome.

## Oral Prophylaxis

Simple dental prophylaxis using a rubber cup and supragingival scaling does not usually require systemic replacement therapy, provided that care is taken not to damage vascular gingival tissues. In cases of more advanced periodontal disease, staged removal of calculus may be necessary. However, if the degree of trauma anticipated is high and the disorder is severe, then replacement therapy is indicated. Because of the high costs involved in providing replacement therapy, full mouth scaling should be accomplished in one session.<sup>4</sup> The use of topical bovine thrombin and periodontal dressings is useful in controlling excessive hemorrhage in localized areas, if necessary.

## Restorative Dentistry

Routine restorative procedures can usually be performed without difficulty in patients with bleeding disorders, although some modification of the dentist's usual practices may be necessary.<sup>5</sup> The use of local anesthesia is, of course, an important consideration. Many authors advocate the avoidance of anesthesia, if possible. This is feasible in minimal preparations for some children, but will not always be practical. Relative analgesia, premedication, and sound behavioral techniques have been used with great success. However, replacement therapy to a minimum level of 50

per cent will allow the safe administration of local and block anesthesia.<sup>6</sup> It is good technique to inject slowly and aspirate to reduce trauma and possible hematoma formation.

Should a hematoma be suspected, the application of ice packs and immediate referral to medical personnel is indicated. Children should be observed closely following the procedure to avoid the possibility of self-inflicted trauma to the anesthetized soft tissues. In some limited restorative procedures, periodontal ligament injections may be sufficient, thus avoiding more traumatic block techniques.<sup>7</sup> When extensive treatment is needed, intravenous or general anesthesia can also be utilized. The use of rubber dam, where possible, will serve to isolate the working area and protect underlying soft tissues. Clamps that do not lacerate gingiva should be selected. Matrix bands should also be fitted carefully, and stainless steel crowns should be well trimmed and crimped prior to cementation. The routine placement of pit and fissure sealants is highly recommended to avoid extensive restorative dentistry.

When pulpal therapy is indicated, this option is preferable to extraction since it will avoid the complications inherent in surgical procedures. All phases of endodontic therapy can be considered, but instrumenting or filling beyond the tooth apex should be avoided.<sup>8</sup>

**Table IV**

## Absorbable Local Hemostatic Agents

| Agent               | Origin                                                                                                | Manufacturer        | Action                                                                                                                                                                                                                    |
|---------------------|-------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Thrombin<br>Topical | Conversion reaction of bovine prothrombin by tissue thromboplastin in presence of CaCl                | Parke-Davis         | Intrinsic – Fibrinogen to fibrin                                                                                                                                                                                          |
| Gelfoam             | Hard spongy animal-skin gelatine                                                                      | Upjohn              | Intrinsic – Disintegration of platelets with subsequent release of thromboplastin, which stimulates formation of thrombin in the interstices of the sponge                                                                |
| Avitene             | Purified bovine corium collagen prepared with preservation of morphology of native collagen molecules | Alcon               | Intrinsic – In contact with bleeding surface attraction of platelets, which adhere to collagen fibrils and undergo release phenomenon to trigger aggregation of platelets into thrombi in interstices of the fibrous mass |
| Oxycel              | Oxidized cellulose (cotton and gauze)                                                                 | Parke-Davis         | Extrinsic – Physical effect: does not enter into normal clotting mechanism. Formation of a gel with blood results in swollen, sticky mass acting as a mechanical block, an artificial coagulum, or a plug                 |
| Surgicel            | Oxidized regenerated cellulose                                                                        | Johnson and Johnson |                                                                                                                                                                                                                           |



Fixed prosthodontics may necessitate the use of replacement therapy if the bleeding disorder is severe or the expected extent of the damage to soft tissue is high.

## Orthodontics

There are no contraindications to the provision of orthodontic therapy to children with bleeding disorders. Indeed, the benefits achieved through this treatment will assist in the long-term maintenance of the dentition by allowing better access for oral hygiene measures. Trays for impression taking should be lined with periphery wax and band fitting should be performed carefully. Oral hygiene must be emphasized and reinforced constantly, and sharp or overextended arch wires need to be avoided. Where possible, removable and interceptive appliances can be used successfully. In the event that extractions are indicated, the regular surgical protocols should be followed.

## Surgical Procedures

Prior to undertaking any proposed surgical treatment, the dentist must consult with the patient's physician or hematologist. In cases where the procedure is complicated, referral to an oral surgeon may be recommended. In more severe bleeding disorders, such as hemophilia A, where replacement therapy is required, a hospital setting allows for a well-coordinated team effort between medical and dental personnel. Replacement therapy consists of the intravenous infusion of factor concentrates, cryoprecipitate, fresh frozen plasma or plasma products on the day of the proposed procedure. Inherent in this therapy, however, is the possibility of transmitting hepatitis (B, non-A non-B, delta) or acquired immune deficiency syndrome (AIDS), along with the development of antibodies or inhibitors. Since these are all serious consequences, other methods have been advocated to eliminate or reduce the use of blood products. Epsilon aminocaproic acid (EACA or Amicar) and transexamic acid, both antifibrinolytic agents, have been available for a number of years.<sup>9,10</sup> In addition, 1-deamino-8-d-arginine (DDAVP), a synthetic vasopressin analogue has been used successfully to augment plasma procoagulant activity.<sup>11</sup> Mild cases of hemophilia A and von Willebrand's disease have responded well to the use of DDAVP and EACA, and the costs associated with this treatment are signifi-

cantly lower than those of replacement therapy.

Patients with one or more of the various acquired coagulation defects are prepared for dental surgery individually, using specific approaches. Where there is a significant risk of infection, in susceptible patients, oral antibiotics are required for at least three days following surgery. In most patients with hematological malignancies, dental extractions should be delayed, if possible, until the disease is brought under control.

Local measures to reduce and control blood loss are also fundamental during surgical procedures.<sup>12</sup> Table IV lists some of the commercially-available topically-applied hemostatic agents used today.<sup>5</sup>

Recently, a two-component fibrin sealant consisting of human fibrinogen concentrate and bovine thrombin (Tisseel - Immuno Canada Ltd.) has been introduced and may have application as a resorbable topical hemostatic agent.

A vigorous hygiene program should be promoted immediately prior to a surgical procedure, since this may directly improve the hemostatic mechanism. Good surgical technique, aided by direct pressure, is usually sufficient to arrest initial hemorrhage. Some practitioners have made use of fabricated acrylic stents to protect, and apply continued pressure on, surgical sites. These may prove useful for a palatal flap, such as might be raised to remove a mesiodens.

Electrosurgery should be avoided as this may lead to tissue necrosis and subsequent bleeding from the wound site. As well, sutures should be placed judiciously to close primary flaps, using a resorbable type of suture to prevent possible recurrent hemorrhage sites upon removal.

A word of caution is in order for dental personnel providing treatment to patients with bleeding disorders - there is a strong possibility that these patients are HIV positive. The wearing of protective eye wear, masks and gloves for examination and subsequent treatment is mandatory, as is the use of hepatitis protocol for sterilization and room preparation when clinical procedures are performed.

## Summary

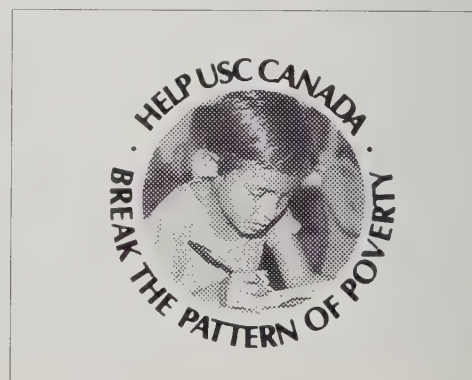
The pediatric dental patient with a bleeding disorder presents a challenge to the treating dentist. With the advances made in the medical management of these patients and the assistance of the child's hematologist and

physician, comprehensive dental care can be provided. An understanding of the nature of the disorder, and the use of an organized protocol thereafter, will greatly assist in delivering this valuable service.

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# Specialty Feature

## Comprehensive Care For Children With Bleeding Disorders A Physician's Perspective

K.H. Luke, MD, FRCP(C)

### ABSTRACT

*As a result of recent advances in the understanding of hemostatic mechanisms – and the availability of more accurate diagnostic tests, effective replacement therapy and medications – most of the common bleeding disorders in children can be diagnosed and managed. Children with bleeding disorders often present with dental problems. Their comprehensive care requires specialized preventive and acute dental treatment. With improvements in dental care protocols and surgical procedures, the risk of excessive bleeding in these children as a result of dental procedures should be minimal, particularly if they are well prepared and treated beforehand. It is important for dentists to be familiar with these specialized dental care protocols and procedures, and knowledgeable about the medical treatment provided to children with bleeding disorders. This allows dentists to coordinate the care of a hemophiliac with his or her physician in a comprehensive manner.*

### SOMMAIRE

*Comme depuis peu on comprend mieux les mécanismes hémostatiques, qu'on obtient des épreuves diagnostiques plus précises et qu'on dispose de bons remèdes et de bons traitements substitutifs, on peut diagnostiquer et traiter la plupart des problèmes d'hémorragie communs chez les enfants. Ceux qui ont de pareils problèmes ont souvent des problèmes dentaires également. Pour bien les soigner, il faut des traitements spécialisés tant pour la prévention que pour les problèmes graves. Comme les protocoles et les procédures chirurgicales s'améliorent sans cesse en dentisterie, les risques de saignements excessifs chez le dentiste devraient être minimes pour ces enfants, surtout si on a soin de bien les préparer pour les traitements qu'ils vont recevoir. Pour les dentistes, il est important de bien connaître ces procédures et ces protocoles spécialisés ainsi que les*

*soins médicaux à donner à ces enfants. De concert avec les médecins, les dentistes peuvent alors coordonner comme il se doit le traitement des hémophiles.*

### Introduction

Children with bleeding disorders often present with dental problems and need comprehensive preventative and acute dental care. In the past, because of concerns over bleeding, the dental care and procedures required by these children were sometimes neglected or delayed. However, with recent advances in the understanding of hemostatic mechanisms and the development of more precise diagnostic tests, effective replacement therapy and medications are available to treat bleeding. In fact, most common bleeding disorders can now be accurately diagnosed and treated before dental procedures are performed. At the same time, progress has been made in preventative dental programs and dental procedures.

To provide comprehensive dental care to children with bleeding disorders, it is important for dentists to be familiar with these specialized dental care protocols and procedures, and skilful at using them. Dentists should also be knowledgeable about the principles and applications of the diagnostic tests and treatments used for these disorders. They can then communicate effectively with the patients' clinicians or hematologists to coordinate, plan and deliver the necessary dental care. In this article, a brief review of the pathology, diagnosis and treatment of the common childhood bleeding disorders that are pertinent to dental care will be presented.

### The Hemostatic System

Clotting is the result of a series of complex chemical and physical reactions between the plasma clotting proteins, platelet and the vascular endothelium. These reactions lead to the formation of a clot so that bleeding can be

stopped within a short time. The detailed biochemistry of these reactions and the function and structures of the various clotting proteins, platelet and endothelium have been extensively studied and summarised in recent texts on coagulation.<sup>1</sup> Upon injury, the blood vessel constricts and the plasma clotting factors that are in contact with collagen are activated through both the intrinsic and extrinsic pathways to activate factor X, which in turn activates prothrombin into thrombin and then fibrinogen into fibrin. In the meantime, the platelet adheres to the injured site and aggregates to form a plug. At this stage, bleeding should cease. The amount of time that it takes to stop the flow of blood is measured in the laboratory as "the bleeding time." In normal children, the bleeding time varies from two to nine minutes.

A later stage of clotting stabilizes the clot through the cross linking of fibrin and the retraction of the clot by the platelet.

Within about five to seven days, the clot will be dissolved by fibrinolysis through the activation of plasmin.

In the past few years, significant advances have been made in understanding the binding of platelet to the endothelial surface by the plasma protein referred to as the Von Willebrand (V-W) factor.<sup>2</sup> This protein functions as a bridge to bind the platelet to the endothelial surface, and it is an essential step for the platelet to adhere to the vessel wall. If there is a decrease in the availability of this protein or its activity due to a variation in structure, the platelet will have difficulty in adhering to the vessel wall, resulting in slower clot formation and prolonged bleeding. The identification of the V-W factor and the ability to measure it in the laboratory have led to the concept of pathology for V-W disease and its new clinical classification.

Another major advance occurred when it became possible to examine the genetic transmission of hemophilia A and B using DNA analysis studies.<sup>3</sup> By



TABLE I:

## Diagnostic Tests In Common Bleeding Disorders In Children

| Common Bleeding Disorders                     | Diagnostic Tests            |     |     |                             |     | Specific                                                   |
|-----------------------------------------------|-----------------------------|-----|-----|-----------------------------|-----|------------------------------------------------------------|
|                                               | Screening                   |     |     |                             |     |                                                            |
|                                               | PT                          | PTT | BT  | PLATELET                    | FDP |                                                            |
| <b>Clotting Factor Defects</b>                |                             |     |     |                             |     |                                                            |
| Hemophilia A (VIII Def)                       | N                           | I   | N   | N                           | N   | Factor VIII Assay                                          |
| Hemophilia B (IX Def)                         | I                           | I   | N   | N                           | N   | Factor IX Assay                                            |
| V-W Disease                                   | N                           | I   | I   | N                           | N   | VIII Assay<br>Resto Cetin-Co- Factor<br>W Multimer Studies |
| Disseminated Intravascular Coagulopathy (DIC) | I                           | I   | I   | D                           | I   | Factor VIII Assay<br>Fibrinogen                            |
| Vitamin K Deficiency/<br>Liver Diseases       | I                           | I   | N   | N                           | N   | Factor II, VII, IX, X<br>Liver Function<br>Tests           |
| <b>Platelet Defects</b>                       |                             |     |     |                             |     |                                                            |
| Immunothrombocytopenia (ITP)                  | N                           | N   | I   | D                           | N   | Bone marrow<br>Platelet<br>Antibodies                      |
| Hemolytic Uremic Syndrome                     | N                           | N   | I   | D                           | I   | Renal Function<br>Tests                                    |
| <b>Vascular Defects</b>                       |                             |     |     |                             |     |                                                            |
| Henoch-Schonlein Purpura                      | N                           | N   | N   | N                           | N   | Renal Function<br>Tests                                    |
| PT                                            | Prothrombin Time            |     | FDP | Fibrin-Degradation Products |     |                                                            |
| PTT                                           | Partial Thromboplastin Time |     | N   | Normal                      |     |                                                            |
| BT                                            | Bleeding Time (Template)    |     | I   | Increase                    |     |                                                            |
|                                               |                             |     | D   | Decrease                    |     |                                                            |

using DNA polymorphism and analysis to study families with hemophilia A and B, the gene segments controlling the transmission of the disease can be characterized and measured. In addition, by comparing the patterns of the gene fragments of different family members, the suspected carriers or fetus can be studied and identified as to their involvement. These techniques have enhanced the accuracy of tests to detect suspected carriers, such as sisters of hemophilia A or B children, and in prenatal diagnosis. By applying DNA recombinant technology, factor VIII has been produced in the laboratory. Clinical studies have now been completed on new factor VIII products, and they will be licensed for clinical use in the near future.

The common bleeding disorders in children and the diagnostic tests for them are summarized in Table I.

### Bleeding Disorders

Based on the pathophysiology of hemostasis, bleeding problems will occur if there is a decrease in the activity or function of the plasma clotting proteins, platelets and vascular endothelium. The causes can be either congenital or acquired. Depending on the severity of the defect, the bleeding problem can be mild to severe.

### Plasma Clotting Factor Deficiencies

Children born with an absence or decrease in any one of the plasma clotting factors are referred to as hemophiliacs. Over 90 per cent of these cases are due to factor VIII deficiency (hemophilia A) and factor IX deficiency (hemophilia B or Christmas disease). Other, rarer types are factor VII, XI and XII deficiencies,

and a decrease or abnormality in fibrinogen (afibrinogenemia and dysfibrinogenemia).

A decrease in plasma clotting factors can occur in acquired pathologies – common examples are over consumption of fibrinogen and factor VIII in disseminated intravascular coagulopathy (DIC) in sepsis; decreases of factor II, VII, XI, and X in vitamin K deficiency and liver diseases; and the presence of circulating anticoagulants such as heparin and coumadin, or antibodies against clotting factors as in systemic lupus erythematosus.

### Platelet Defects

Congenital platelet defects are very rare. The platelet can be absent or markedly decreased, as in amegakaryocyte thrombocytopenia (radial platelet syn-



drome), or abnormal in function, as in thrombasthenia and thrombocytopathies.

The commonest platelet defect in children is thrombocytopenia, which has an etiology that is either idiopathic or immune, and is referred to as idiopathic or immune thrombocytopenia (ITP). There is an increased destruction of platelet by the spleen and, in most cases, due to the action of antibodies to platelet. Other causes for increased consumption of platelets are related to drugs, DIC or splenomegaly.

Decreased platelet can be due to reduced production by the bone marrow as the result of suppression (aplasia) or infiltration (leukemia, malignancies). Transient bone marrow suppression can occur with infection, particularly viral illnesses, or drugs. In such cases, recovery should be expected in a short time (10 to 14 days).

In young children, hemolytic uremic syndrome should be recognised. Sometimes, following a certain type of E coli infection, children will develop thrombocytopenia, hemolytic anemia and uremia.

An acquired platelet function defect due to Aspirin (acetyl-salicylate acid (ASA)) is common. ASA binds to the platelet and decreases the aggregation activity of platelets. This leads to a prolonged bleeding time.

## Vascular Defects

At present, the ability to study and understand vascular defects is limited. The common pathologies are those associated with vasculitis. In children, an allergic vasculopathy referred to as Henoch Schonlen purpura is common. Often, forms of vasculitis may be related to viral diseases and collagen vascular disorders.

## Hemophilias

Both hemophilia A and B are sex linked. The mother carries the hemophilia gene in the X-chromosome, and 50 per cent of her male offspring could be affected. In about 10 per cent of cases, there is no family history.

In severe cases, bleeding and hematoma may occur shortly after birth at trauma, injection, umbilical and circumcision sites. Later in infancy and childhood, recurrent bleeding may occur in muscles and joints, leading to arthropathies and deformities. Head injury may cause serious and sometimes fatal bleeding into the central nervous system. With recurrent bleeding from gums

and teeth, dental caries and gingivitis are common in hemophiliacs.

## Diagnosis

The partial thromboplastin time (PTT) of hemophiliacs will be increased in screening tests. In severe cases, the PTT will be over 100 seconds.

The diagnosis of hemophilia is confirmed by measuring the level of the factor VIII activity as severe (less than one per cent), moderate (one to five per cent) and mild (greater than five per cent).

## Management

Bleeding is controlled by replacing the missing clotting factor. In hemophilia A, factor VIII is available in the form of plasma, cryoprecipitate and concentrates. The new concentrates are very highly purified and are inactivated for viruses such as HIV-I and non A/non B hepatitis.<sup>4</sup> By infusing one unit of factor VIII per kilogram of body weight, the *in vivo* factor VIII activity will be increased by approximately two per cent.

## Preparation for Dental Procedures

In the severe hemophiliac, factor VIII can be raised to 50 per cent by infusing the calculated dose of factor VIII concentrate about 15 to 30 minutes before surgery.

However, in view of the short half life of factor VIII (about eight to 12 hours), repeated infusions of factor VIII would be required following extensive surgery.

If there is no excessive bleeding during surgery, and after day care observation, epsilon aminocaproic acid (EACA), 100 milligrams per kg, can be given by mouth every six hours for three to five days to minimize lysing of the clot. The child can be followed on an out-patient basis.

In mild hemophilia, to avoid unnecessary infusion of blood products, desmopressin DDAVP (15  $\mu$ g/kg) can be infused intravenously to increase *in vivo* clotting activities.<sup>5</sup>

For factor IX deficiency, the same principles of using concentrates apply, except that the half life of factor IX lasts 30 hours after infusion. Daily infusion of concentrate will be adequate.

Most children with hemophilia are treated in comprehensive care centres that have a dental care program. It is advisable that dental procedures are done in such centres so that back-up hemo-

static facilities are readily available.

About five to 10 per cent of hemophilia A children will have an inhibitor. If the titre is low, it can be neutralized by a higher dose of factor VIII infusion. However, specialized treatment will be necessary for the high titre inhibitor patient, such as using activated prothrombin complex concentrates, porcine factor VIII, plasmapheresis or immunotolerance treated with very high dosage of factor VIII. Such patients must be managed in very specialized hemophilia centres, as bleeding may be difficult to control.

## Risks to Use of Blood and Blood Products

Hemophiliac children who received concentrates before 1985 are at high risk for having been exposed to the HIV-I virus. In 1990, a survey of Canadian children with severe hemophilia A showed HIV seropositivity in 35 per cent of the cases.<sup>6</sup> Several of these children have died of AIDS. When the T4-lymphocyte count in seropositive children is below 300 to 500, they are candidates for AZT treatment.

The natural history of these HIV positive children is being monitored carefully. There is a high incidence of hepatitis B and non A/non B hepatitis in severe hemophiliacs. Universal precautions should be used by all personnel performing dental procedures on hemophiliacs. In Canada, at present, the risk of contracting an HIV-I infection as the direct result of receiving a blood transfusion is about one in five million.

## Von Willebrand Disease

These patients were once called "pseudohemophiliacs" because their bleeding tendency mimics that of the hemophiliac. Subsequently, it was found that the plasma of hemophiliacs can improve the bleeding tendencies of these patients. With advances in high-resolution immuno-electrophoresis techniques, a plasma protein (V-W factor) was identified which binds the platelet to the endothelium surface of blood vessels.

Depending on the availability and function of the V-W factor, bleeding tendency varies from mild to severe. In 1987, a new classification of the disease was introduced as Type I (absence or decrease of V-W Factor) and Type II (decrease in function due to changes in, and the structure, of the V-W factors). At present, seven type II cases have



been described. Type I, with absence of V-W factor, is usually associated with severe bleeding. The genetic transmission is autosomal dominance.

Bleeding is characterized by increased bruising and bleeding through the mucosa, particularly as recurrent epistaxis, GI or G-U bleeding. Menorrhagia is a frequent presenting complaint. These children also have prolonged bleeding from cuts. In mild cases, a good bleeding history is helpful in establishing a diagnosis. In a study on children with recurrent epistaxis, it was shown that a good bleeding history would help to select patients for investigation and improve the diagnostic value of the current testings by three fold (from five to 16 per cent).<sup>7</sup>

## Diagnosis

To establish the diagnosis, classic laboratory tests would include a prolonged bleed time, decreased factor VIII activity and decreased platelet adhesive function. More recently, measuring the plasma ristocetin-co-factor activity in platelet aggregation, and the direct measurement of V-W factor multimers by high resolution immuno-electrophoresis confirm the diagnosis. At present, these tests are done only at reference laboratories.

## Management

### Preparation for Dental Procedures

Correct diagnosis is important for planning specialized treatment for occasional type II disorders. However, the controlling of bleeding in V-W disease is less precise than in hemophilia A, because there is no precise test to guide this control. Measuring bleeding time and factor VIII response to treatment are generally used. In mild type I cases, bleeding tendencies can be improved with DDAVP infusion for dental procedures. In severe cases, cryoprecipitate which is rich in V-W factor was infused to decrease bleeding time and increase factor VIII activity by up to 50-60 per cent. The correction of the bleeding time is short lived, lasting only for one to two hours. Repeated infusions would be necessary over several days.

## Platelet Disorders

### Idiopathic or Immune Thrombocytopenia (ITP)

In children, immune thrombocytopenia (ITP) is the commonest platelet pathology. For the most part, ITP occurs

in children of three to six years of age following some form of viral-like illnesses. In over 80 per cent of cases, a platelet antibody can be demonstrated with raised sequestration of platelet by the spleen. Diagnosis is made by a bone marrow examination to exclude any primary bone marrow disorders, such as leukemia and aplastic anemia. Eighty-five per cent of the children recover in three to 24 weeks.

## Management

It is difficult to define precisely the platelet level at which bleeding will occur. A general guide is platelet count less than  $50 \times 10^9/L$ . When the platelet count level is below  $20 \times 10^9/L$ , it is considered as severe thrombocytopenia.

To support dental procedures, we would like platelet counts to be above  $100 \times 10^9/L$ . In ITP, a platelet rise can be induced by treating the child with prednisone, four mg/kg daily for one week, or IV gamma globulin, one g/kg per day intravenously times two doses. Both treatments can induce a platelet rise above  $50 \times 10^9$  in 48 hours in 90 per cent of the cases. It is important that the clinicians are given an approximate time of treatment by the dentist, so that the child can be properly prepared for the dental procedures.

In about 10 per cent of patients, thrombocytopenia can last for longer than six months and is diagnosed as chronic ITP. If the patient is blood group Rh +ve, platelet response has been achieved with anti Rh gamma globulin (Rhogan) by inducing a small hemolysis.<sup>8</sup> In a few cases, a splenectomy may be necessary.

To support patients with bone marrow suppression, or if a patient is resistant to platelet transfusion, single donor platelet can be used. A platelet transfusion of approximately one unit per square metre of body surface can raise the platelet by  $10 \times 10^9/L$ . If a patient has transfusion reactions, we would use a filter (PALL filter) to remove the leucocytes. Special patients, such as candidates for bone marrow transplant, would need irradiated or CMV negative platelet.

Congenital platelet defects such as radial platelet syndrome (amegakaryocytic thrombocytopenia), thrombasthenia, and thrombocytopathies are rare. Platelet transfusion may be required for dental work.

## Summary

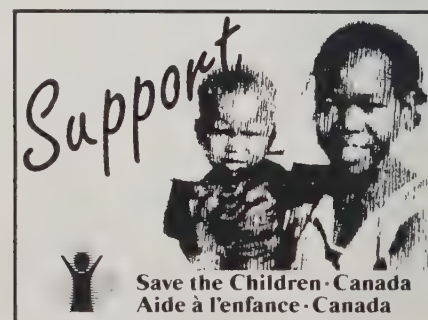
Children with bleeding disorders

should have a comprehensive preventative and acute dental care program. With the advances in diagnostic testing and the availability of effective treatment, the common bleeding disorders can be accurately diagnosed and treated so that dental procedures can be safely performed. It is important that the dentists and the clinicians coordinate their activities in planning for dental care and procedures.

*Dr. Luke is chief of the hematology/oncology service, chief of the division of hematology/blood bank and chief of the department of laboratory medicine at the Children's Hospital of Eastern Ontario. He is also an associate professor with the department of pediatrics at the University of Ottawa.*

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# Specialty Feature

## Cancer in Children

Elizabeth Y. Hsu, MD, FRCPC

### ABSTRACT

Cancer is a relatively unusual disease entity in children. However, its diagnosis often proves devastating for the families of afflicted youngsters. The types of cancer seen in children are very different from those found in adults. Primarily, they include leukemias, lymphomas and brain tumors. In most cases, the cause(s) of these cancers is unknown. Standard treatment modalities include surgery, radiotherapy and chemotherapy. Treatment is generally provided by a multidisciplinary team which deals with attempts to eradicate cancer and provides support when there are complications of disease and treatment. The team also pays attention to the psychosocial needs of the child and the entire family unit.

With recent improvements in cancer therapy, many children are now considered to be "cures." Treatment is tailored to the different subgroups of each disease entity in order to improve response. Research on the etiology of cancer and the treatment of patients with resistant disease is continuously being carried out by cooperative groups. Attention is being directed at the long-term complications occurring in the increasing number of children who have been cured of this still devastating disease.

### SOMMAIRE

Bien que le cancer soit une maladie relativement rare chez les enfants, les parents sont souvent atterrés lorsqu'ils apprennent que leurs enfants en sont atteints. Les sortes de cancers dont peuvent souffrir les enfants ont très différents de celles que peuvent avoir les adultes. Elles comprennent les leucémies, les lymphomes et les tumeurs du cerveau. Dans la plupart des cas, la ou les causes sont inconnues. Habituellement, on a recours à la chirurgie, à la radiothérapie et à la chimiothérapie pour les traiter. En général, c'est une équipe multidisciplinaire qui s'occupe de ces cas, essayant d'enrayer la maladie et intervenant lorsque surviennent des complications. Elle s'occupe également des besoins psychosociaux de l'enfant et de sa famille.

*Avec les récents progrès réalisés dans les traitements du cancer, on considère que de nombreux enfants peuvent maintenant être guéris. Pour obtenir de meilleurs résultats, on adapte les traitements suivant les sous-groupes de la maladie. Par ailleurs, les recherches sur l'étiologie du cancer et sur les traitements à donner aux patients atteints d'un cancer résistant se poursuivent toujours. On étudie particulièrement les complications qui, à long terme, surviennent chez un nombre de plus en plus grand d'enfants qu'on a réussi à guérir de cette terrible maladie.*

### Key Words

Children, Cancer

Cancer is a rare disease in children. It typically strikes one child in 600 below the age of 15, with 360 new cases occurring annually in Ontario.<sup>1</sup> Statistics Canada has reported cancer to be a leading cause of death in children between one and 15 years of age, second only to accidents. Fortunately, remarkable advances have been made in the diagnosis and management of childhood malignancies in the past few decades. This has significantly increased the survival of children suffering from cancer.

### Etiology

The cause of cancer is unknown. It is

generally accepted that most tumors represent replications of cells in which the genes regulating cell growth and development no longer function normally. This is thought to be due to the excessive growth of the promoting genes or because of the deletion of the suppressor genes.<sup>2</sup>

The specific genetic changes caused by some viruses and carcinogens are well documented. Research has identified the presence of various viruses such as Epstein-Barr and human lymphotropic virus I in some lymphoma and leukemic cells. It is thought that these viruses cause lymphoid proliferation and render these lymphoid cells more susceptible to subsequent leukemogenic insults.

In a small proportion of patients,<sup>3,4</sup> there may be recognizable predisposing factors such as Down's syndrome; immunodeficiency syndromes, which increase the risks of developing leukemia; intrauterine exposures to carcinogenic agents such as radiation; and familial cancer syndromes, e.g. neurofibromatosis, and retinoblastoma (Fig 1). In contrast to adult patients, no direct environmental factors – such as tobacco in lung cancer – can be identified in children.

### Diagnosis and Investigation

Cancers of the lung, breast and colon, the most common types of malignancies seen in adults, are almost unknown in

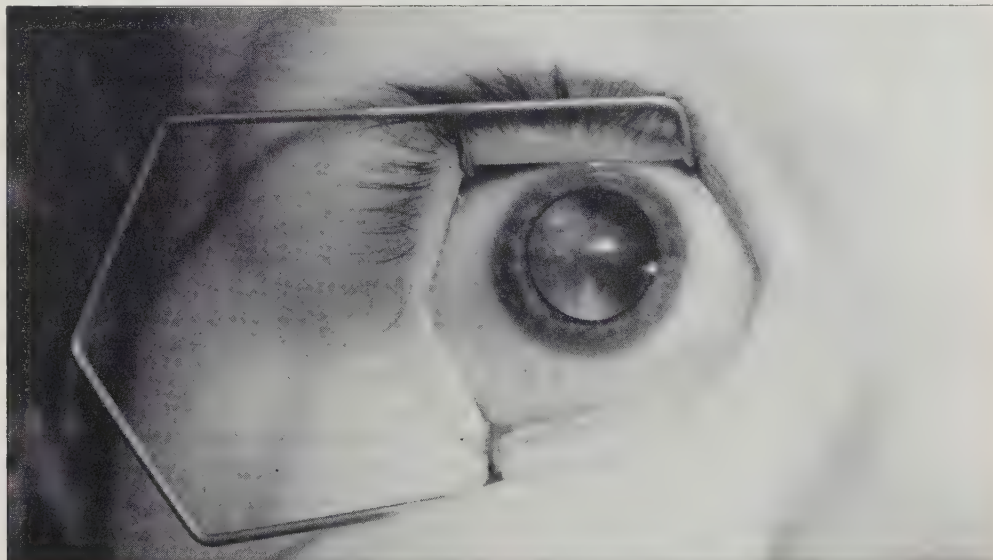
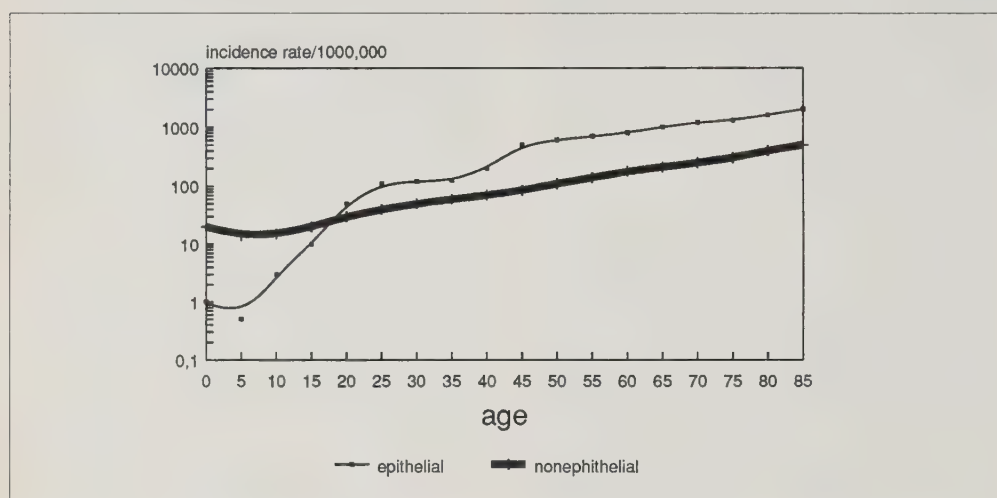
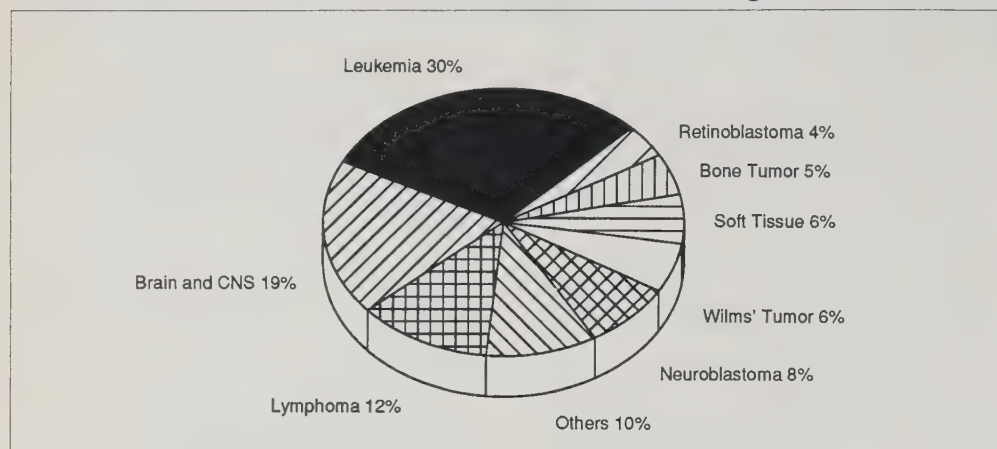


Fig. 1: Leukocoria in an infant with retinoblastoma.

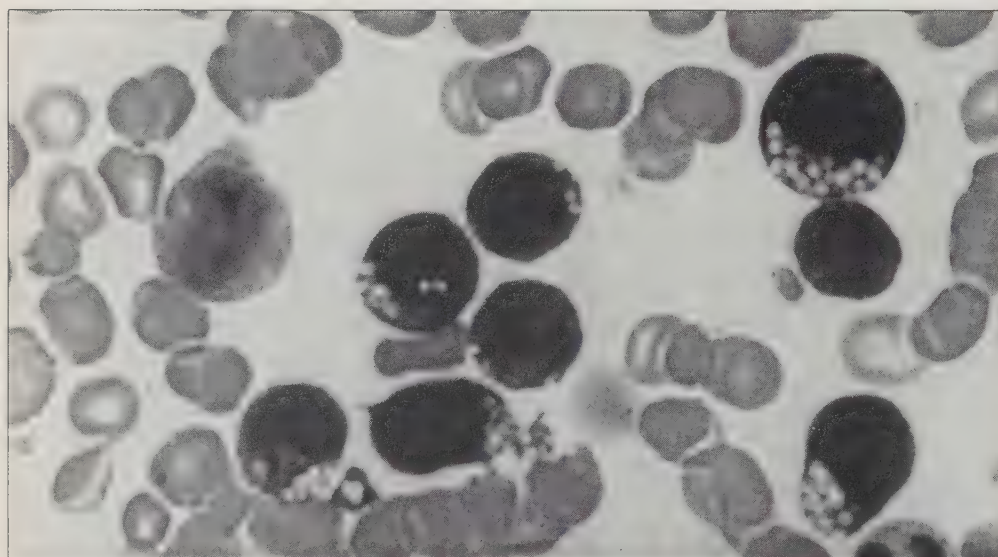


**TABLE I:**

**Incidence of cancer in children under the age of 15**



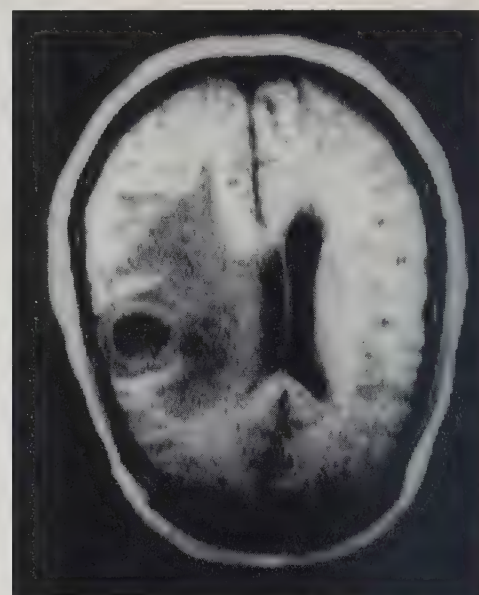
**Fig. 2:** Cancer in Children. Epithelial versus nonepithelial (adapted from Miller, R.W., *Lancet* 2:1250, 1983).



**Fig. 3:** Acute lymphoblastic leukemia, B cell. (Wright Giesma stain, x 1,000).

the pediatric age group. The same applies for most types of carcinomata, being of epithelial origin (Fig 2).<sup>5</sup> In children, leukemia occurs in over 30 per cent of cancer cases, with brain tumor occurring in 20 per cent. Together with

lymphoma, they account for almost 60 per cent of all the pediatric cancers. Other rarer tumors – such as Wilms' tumor, neuroblastoma and retinoblastoma – are seen almost exclusively in children (Table I).



**Fig. 4:** Magnetic resonance imaging scan of brain. Glioblastoma of parietal lobe with surrounding edema.

## Leukemia

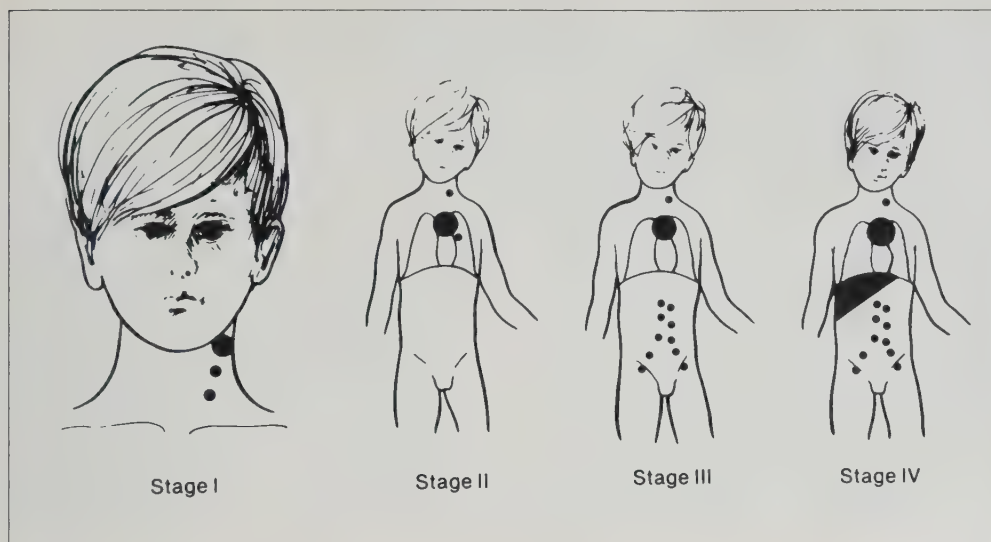
Leukemia presents with symptoms resulting from bone marrow failure, which include pallor, recurrent infections and bruising or bleeding. These are usually associated with signs of lymphadenopathy and hepatosplenomegaly. Other less common signs and symptoms of infiltration include bone pain, subcutaneous nodules and gum hypertrophy.

Chronic leukemia is seen in less than five per cent of the cases, while acute lymphoblastic leukemia (ALL), the most common type, accounts for 70 per cent. (The other leukemias seen in children are acute myelogenous in type.) Leukemias are diagnosed by the detection of marrow replacement with typical blasts cells on morphology (Fig 3). They can further be characterized by cell surface markers which delineate whether the cells are of B, T, or non-B, non-T cell origin. Cytogenetics correlates with some morphological and prognostic subtypes. In assessing the extent of disease, examination of extramedullary sites, such as cerebrospinal fluid, is necessary.

## Brain Tumors

Sixty per cent of the brain tumors occurring in children are located in the posterior fossa. Therefore, patients commonly present with symptoms and signs of obstructive hydrocephalus, with progressively worse headaches and vomiting. They may have clumsiness, ataxia and ophthalmoplegia, indi-





**Fig. 5:** Ann Arbor staging system in Hodgkins' disease (adapted from Sullivan, P., *Hematology/Oncology Clinics of North America*, 1:603-20, 1987).

cating cerebellar involvement. Imaging techniques using contrast-enhancing material can identify the location and therefore predict resectability (Fig 4). Brain tumors rarely spread outside of the central nervous system.

## Lymphoma

Either Hodgkin's disease or non-Hodgkin's lymphoma characteristically present as cervical masses. Lymph node enlargement in the mediastinum may mimic other causes of obstructive airway disease. When the lymphadenopathy is in the abdomen, patients can develop signs of bowel obstruction and abdominal distension. Systemic symptoms of weight loss, fever and anorexia are not unusual. Staging studies include a search for disease in other nodes in the spleen, liver and bone marrow (Fig 5).<sup>6</sup>

## Other Solid Tumors

Other solid tumors such as Wilms' tumor or neuroblastoma usually present as abdominal masses. Neuroblastoma, unfortunately, may metastasize widely before the original tumor is identified. It has a predilection for bone and marrow. An increased amount of metabolites of adrenaline or noradrenaline can be detected by biochemical methods in the blood or urine of these patients.

Soft tissue sarcoma can occur as a mass lesion in almost any site in the body. Bone tumor has a predilection for long bones and usually causes pain and persistent limp or dysfunction of the involved bone (Fig 6).

Staging procedures to assess the disease are essential in the planning of therapy in solid tumors.

## Treatment

It is important to recognize that cancer therapy involves treatment of not only the disease, but also of the complications that result from treatment. Once the diagnosis has been made, three major modalities of therapy are available: surgery, radiotherapy and chemotherapy. Patients may require one or more of these therapies in an attempt to eradicate the disease. Careful planning of the timing of each modality requires multidisciplinary teamwork.<sup>7</sup> Protocols or treatment plans are carefully designed to establish the ideal type, frequency and duration of treatment. In order to develop more effective treatment, comparative studies involving a large number of patients need to be carried out. Since cancer is relatively rare, the major centres dealing with pediatric cancers have pooled their patients together to test the efficacy of these new treatments.

## Surgery

Surgery has remained the treatment of choice for most solid tumors without metastasis. Modern radiological techniques with ultrasonography, computerized tomography, magnetic resonance imaging, radionuclide scans and angiograms have allowed the surgeons to be more precise in pinpointing the extent of the disease and therefore to better plan the operative procedure.

When the disease is extensive, biopsy is followed by treatment with other modalities of treatment. Second look surgery can be done once the tumor is considered to be resectable. With better treatment alternatives, newer techniques such as limb salvage surgery



**Fig. 6:** X-ray of osteogenic sarcoma of the proximal tibia showing irregular destruction and periosteal new bone.

have been able to replace amputations for bone tumors involving long bones in many situations.

In patients with osteogenic sarcoma, resection of pulmonary metastasis may offer a chance of long-term survival.

## Radiotherapy

Treatment with radiation from an external source of cobalt 60 has been available for almost half a century. It is considered to be the sole treatment for many low-grade brain tumors, especially those which are not accessible to surgical resection. Lymphomata are generally sensitive to radiation, which is only necessary under certain circumstances. In many other solid tumors, radiotherapy is an integral part of the treatment plans. It is also used extensively in preparing most patients with leukemia or solid tumors prior to bone marrow transplantation.

At the experimental level, intraoperative radiation and brachytherapy (radiation source placed in the tumor) allows for higher doses of radiation to the tumor, in part because of the decreased amount directed at the surrounding tissue.

## Chemotherapy

Since cancer is rarely a localized process, chemotherapy is frequently used to prevent or treat metastasis. The original use of antimetabolite agents was based on the observation that folic acid worsens leukemia. Since then, drugs have been shown to cause either



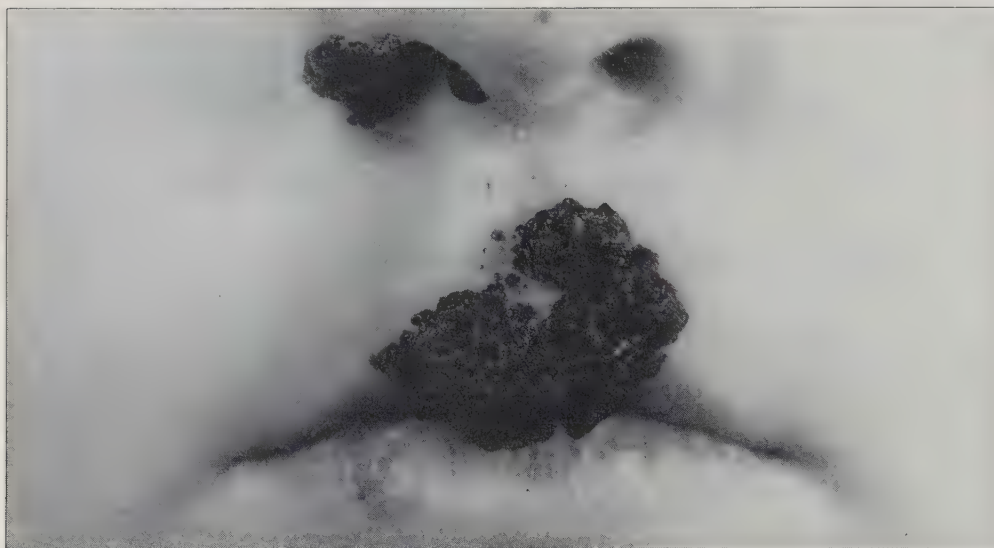


Fig. 7: Hemorrhagic herpetic lesion in a child with ALL.

a direct effect on the synthesis and metabolism of DNA or on cell division. In addition, drugs that are useful for treating specific diseases have been identified. Combinations of two or more agents based on different mechanisms of action and side effects are used to prevent emergence of resistance.

Chemotherapeutic agents are given intravenously, intramuscularly, orally or subcutaneously. Because chemotherapy affects fast growing cells, side effects are most evident in the gastrointestinal tract, bone marrow and hair follicles, with symptoms of nausea, vomiting, mucositis, pancytopenia and alopecia. Although these untoward symptoms are temporary, they contribute significantly to morbidity and mortality.

Treatment of leukemia involves mainly chemotherapy. It can be divided into three phases. In the induction phase, drugs are used to remove detectable disease and achieve remission. During intensification, more aggressive treatment is used to reduce the potential tumor load. Maintenance, the third phase, varies in duration, but its objective is to maintain remission and good health. During this phase, treatment is usually on an outpatient basis to allow for normal daily living. Relapse indicates return of disease activity and therefore failure of the treatment plan.

New drugs are continuously being tested in an attempt to add to the chemical armamentarium.

## Common Health Issues

Major causes of mortality and morbidity in cancer, whether from the disease or treatment, are due to severe infections or bleeding. Psychosocial

needs are also enormous as the disease is still perceived by many to be fatal.

## Infection

Skin and mucous membranes are normally efficient barriers to pathogenic bacteria and fungi. These surfaces are ineffective when the white cells are decreased or when there are breakdowns due to direct tumor invasion, intravenous line placements and mucositis.<sup>8</sup> Many cancer patients with leukemia and lymphoma receive immunosuppressive agents. These individuals are at further risk to develop systemic infections from viruses, fungi and opportunistic organisms (Fig 7).

To minimize infections, meticulous handling of patients with severe leukopenia is essential. Surgical procedures such as central line placement and dental extractions are ideally done when the patient's neutrophil count is above  $1.0 \times 10^9/L$ . In patients with fever, both gram positive and enteric organisms can be the culprit and must be treated promptly. Newer antibiotics have been more potent in handling resistant organisms.

In light of their decreased immune status, almost all cancer patients are advised not to receive live virus vaccination (because of the possibility that they would actually develop the disease).

## Bleeding

Thrombocytopenia is another major complication of disease or chemotherapy. Bleeding that is secondary to a low platelet count can be improved by giving random or single donor platelets.

Spontaneous hemorrhage rarely occurs in patients with a platelet count of

over  $20 \times 10^9/L$ . In cases of severe bleeding or surgical procedures, platelet count should be kept above  $50 \times 10^9/L$ . If anemia occurs, the patient's blood may need to be replaced with packed cells, with hemoglobin kept above 70 gm/L. Blood products are usually irradiated to prevent graft versus host disease – in which the competent lymphocytes of the donor may cause significant damage to the skin, gastrointestinal tract and liver of the recipient. Patients are discouraged from taking medications such as salicylic acid or nonsteroidal anti-inflammatory drugs because of their suppressive effects on platelet functions.

## Other Supportive Care

In many children, anorexia or mucositis resulting from complications of the disease or treatment may contribute to a poor nutritional state. Special diets, and sometimes enteric feeding via nasogastric tubes or total parenteral feeding, are needed to improve the sense of well-being of the child.

Because pain is generally associated with both the cancer process and the diagnostic and therapeutic procedures, analgesic medications and sedation are often necessary to help the young patient to cope. Personnel adept at using play therapy or relaxation techniques may also help these children to express their anger and frustration.

Unfortunately, the cost of medication is not always covered by insurance programs. Parents can also be burdened financially, as one of them may decide to stay at the child's side during the period of extensive therapy. These financial pressures, taken together with the pressure of meeting the ongoing needs of the cancer patient's siblings (if any) and the tremendous stress already present due to the diagnosis and treatment, may cause parents to feel overwhelmed. Therefore, psychosocial support for the family is an integral part of the management of childhood cancer.

## Newer Methods of Treatment

Research breakthroughs have occurred in both treatment and supportive therapy. In disease control, newer and more innovative methods of stimulating the immune system and the use of synthetic monoclonal antibodies show promising results. Bone marrow transplantations have been used successfully in patients whose disease has recurred, by allowing treatment with higher than tolerable doses of chemotherapy and



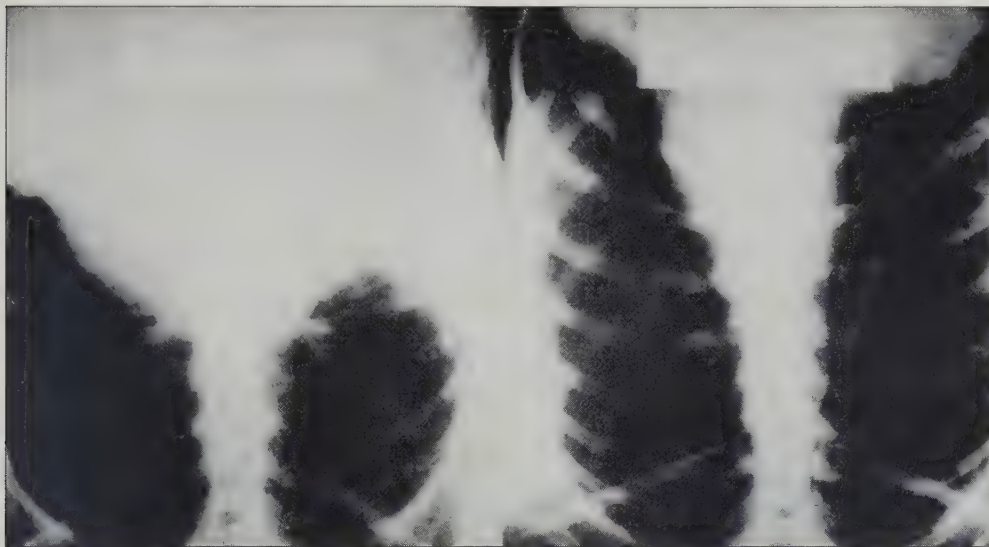


Fig. 8: Congestive failure secondary to doxorubicin.

TABLE II:

### Estimated survival of some pediatric cancers.

|                              | Five Year Survival (per cent) |                    |
|------------------------------|-------------------------------|--------------------|
|                              | 1960s                         | 1980s              |
| Acute Lymphoblastic Leukemia | 18                            | 80 (standard risk) |
| Hodgkin's Disease            | 53                            | 97                 |
| Brain and nervous system     | 45                            | 57                 |
| Neuroblastoma                | 25                            | 55                 |
| Wilms' tumor                 | 65                            | 81                 |
| Osteosarcoma                 | 28                            | 59                 |

radiotherapy. The use of unrelated donors has increased the donor pool and autologous transplantation is being considered in increasing frequency in patients with solid tumors.

There is excellent preliminary evidence that hemopoietic growth factors, which stimulate white cell synthesis, can shorten the period of neutropenia. These factors therefore minimize the chance of major bacterial sepsis and allow for a higher dose intensity of chemotherapy over time.<sup>8</sup> Use of serotonin antagonists have significantly decreased nausea and vomiting due to treatment.

### Prognosis and Long-Term Effects

Survival has improved drastically in recent years. Wilms' tumor and Hodgkin's disease patients enjoy a better than 80 per cent long-term survival. Cure rate in standard risk ALL is reaching the same level. Most of the other childhood cancers carry a better than 50 per cent five year disease-free survival rate (Table II).<sup>9,10</sup>

It has been estimated that in the year 2000, one in every 1,000 20-year-olds will be a survivor of childhood cancer.<sup>11</sup> Therefore the delayed consequences of therapy are of major importance and concern. Radiation to the brain is given in most cases of brain tumor and in some patients with ALL. This has been recognized to affect intelligence and/or coordination, depending on the age at which the child received treatment. In very young children with developing brains, the deleterious effects that radiation to the brain has on intelligence and growth is much more evident.

Gonadal, cardiac and pulmonary dysfunction have been seen in long-term survivors after chemotherapy or radiation treatment. The problem of second neoplasms is one of the most serious long-term complications seen, affecting about five per cent of patients.

### Summary

Many children with cancer live into adult life because of aggressive treatment and excellent supportive care. Much research is still necessary to improve the survival in resistant disease

and to decrease both the short- and long-term consequences of therapy. Better techniques for the identification of residual disease may help define optimal therapy, and the understanding of the molecular biology of cancer may help prevent this still devastating disease.

Dr. Hsu is a pediatric hematologist/oncologist with the Children's Hospital of Eastern Ontario and an assistant professor in pediatrics at the University of Ottawa.

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# Specialty Feature

## Dental Considerations for the Pediatric Oncology Patient

Mary Larissa Krywulak, DMD, MS, Ped. Dent.

### ABSTRACT

*A multidisciplinary management approach is required to provide care to the pediatric cancer patient. This article reviews the oral manifestations of cancer therapy, discusses some issues to be considered by the dentist and summarizes some of the treatment modalities available to the dental practitioner.*

### SOMMAIRE

*Pour soigner les enfants souffrant du cancer, il faut une approche multidisciplinaire. Dans cet article, on passe en revue les manifestations buccales chez les patients traités contre le cancer, on examine quelques-uns des facteurs dont le dentiste doit tenir compte et on résume les modes de traitement dont le praticien dentaire dispose.*

### Introduction

Providing ideal care to the pediatric cancer patient requires a multidisciplinary approach. Cancer is the second leading cause of death in children – second only to accidents – with leukemia being the most prevalent form of childhood cancer, followed by brain and nervous system cancers.

As medical research progresses and treatment modalities improve, the role of dentists in the oral management of these patients will become increasingly important. Thorough oral management can be achieved when hospital medical and dental teams work in close cooperation with the patient, his or her family, medical staff and private dentists. This article will focus on some of the common oral manifestations of cancer treatment and their usual management.

### Issues to Consider

Cancer may be defined as an abnormal proliferation of cells resulting in the invasion of adjacent normal tissues, dissemination to distant organs (metas-

tases) or both. The medical management of patients with cancer may include surgery, radiotherapy, chemotherapy, experimental modalities and support services. Subsequent oral complications may be influenced by patient-related factors such as dental status prior to and during cancer therapy, level of oral hygiene, dietary habits, age, emotional status and the type of parental support. The method and extent of the medical management used to treat a cancer patient may result in various degrees of oral complications. It is for this reason that the oral status of the child should be determined early on, shortly after cancer is diagnosed, so that a strong preventive program of care may be implemented.

Medical treatment of cancer often results in an immunosuppressed child who is highly susceptible to infections. Hence, dental sources of infection must be dealt with early on to prevent serious complications to the child's well-being.

### Oral Complications

Children with hematologic disorders

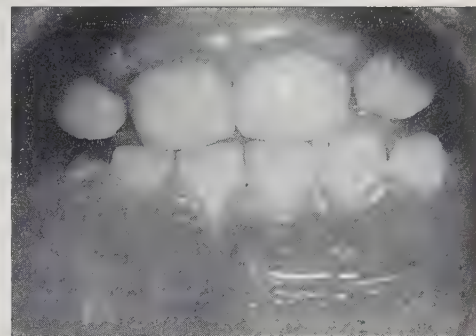


Fig. 1: Mucositis

such as leukemia, aplastic anemia, etc., develop oral complications at a higher rate than those with other forms of cancer.<sup>1</sup> Fig. 1 illustrates red, inflamed-looking soft tissue which does not respond to diligent oral hygiene. The oral manifestations, together with a medical history including lethargy, prolonged fevers, bruising, anorexia and malaise, may allow the family dental practitioner to be the primary diagnostician.

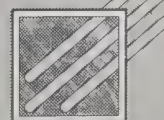
The leukemic child is more vulnerable to infection because the disease produces large quantities of ineffective white cells and, secondly, because of the

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**Fig. 2: Ulcerations**

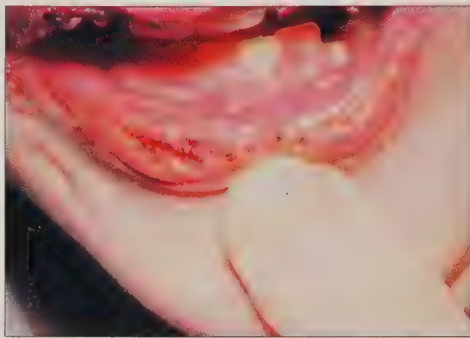


**Fig. 3: Ulcerations**

treatment provided. Neutrophil (granulocyte) counts may drop as low as 1,000 cells/mm<sup>3</sup> during the disease's active stage and levels may plummet during chemotherapy. Thrombocytopenia is usually the major cause of hemorrhaging in leukemia patients. For the dental practitioner, the management of these patients requires diligent pre-operative assessment of the total granulocyte count as well as of platelet counts. Close consultation with the oncologist/hematologist is a must. The high risk for infection requires the dentist to treat carious lesions definitively, and necessitates the implementation of a strong preventive program.

Most chemotherapy medications function by interfering with the ability of cancer cells to grow and multiply – the cells most frequently affected are those that have a rapid rate of multiplication. The side effects of these drugs result, in large part, from the actions of the drugs on normal cells. For example, hair follicles are affected by the chemotherapeutic drugs, leading to hair loss. Similarly, rapidly reproducing oral mucosa cells may be affected, resulting in oral ulcerations.

Several oral changes may occur during cancer treatment. Mucositis presents as a red swelling of the oral mucosa due to the thinning of the epithelium. The mucositis may be present with or without pain, and may progress with cell desquamation, resulting in painful ulcerations (Figs. 2 and 3). Drugs such as cyclophosphamide,

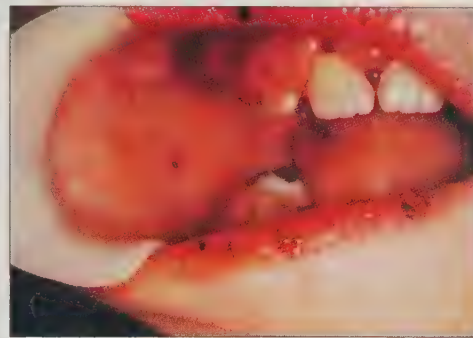


**Fig. 4: Herpes Simplex Virus**



**Fig. 5: Oral petechiae**

methotrexate, vincristine, 6-mercaptopurine and cytosine arabinoside are frequently used in the treatment of cancers, and toxic manifestations often include ulcerations. Painful ulcers may interfere with the child's ability to eat. In addition, open ulcers act as a focus for infection in the immunosuppressed child. Patients with hematologic malignancies are particularly vulnerable to infection by the herpes simplex virus, which affects the skin and mucous membranes, resulting in a febrile child with multiple vesicular lesions that



**Fig. 6: Oral petechiae**



**Fig. 7: Candida albicans**

break, leaving painful ulcerations (Fig. 4). Oral ulcers cause significant discomfort, inability to swallow and interfere with the child's ability to eat and maintain their weight.

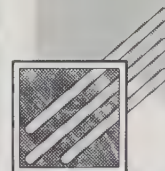
As the treatment of the cancer progresses, platelet levels may drop drastically, necessitating a transfusion. The platelet deficiency is seen intra-orally by observing multiple petechiae and hematomas (Figs. 5 and 6). Dry, chapped lips must be frequently hydrated with creams to prevent the formation of large cracks, which easily become infected by

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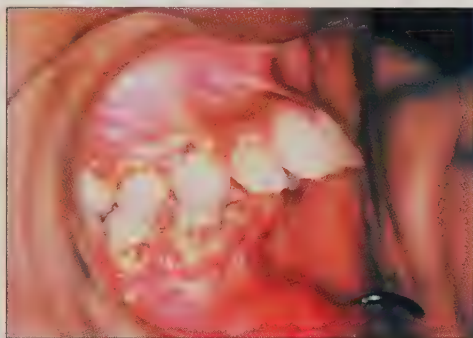
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**Fig 8:** Dental decay



**Fig. 9:** Coronal decay resulting in abscessing and arrested root growth

oral bacteria. Opportunistic infection by *Candida albicans* may be diagnosed by rubbing off white patches that leave a red patch underneath (Fig. 7). Yeast infections require aggressive treatment with medications such as nystatin or amphotericin B.

Alterations in the salivary glands may result from both chemotherapy and radiotherapy. Salivary flow rate is reduced, the saliva becomes ropy and viscous, and unable to wash away oral acids and food debris. Swallowing may become difficult and painful. With the decrease in salivary flow rate, a shift in microflora may occur. A decrease in the quantity of streptococcus sanguis, neisseria, bacteroides, and fusobacteria is observed, along with a simultaneous increase in streptococcus mutants, lactobacilli, staphylococcus, yeast, diphtheroids and total anaerobes.<sup>2</sup> This translates into a higher propensity for acid production and a lack of salivary buffering. In combination with the high carbohydrate diet often offered by distraught parents, and frequent vomiting episodes due to therapy, the child can

rapidly develop decalcifications and rampant decay<sup>3</sup> (Fig. 8). If left untreated, the decay can progress into an abscessed tooth, resulting in a life-threatening situation.

Diet, appetite and taste changes are not infrequent. Often, the parents and nutritionists struggle to maintain the child's caloric intake. When the child will not drink or take food orally, or when food consumption results in frequent vomiting, he or she is placed on total parenteral nutrition (TPN).

Long-term sequelae from radiotherapy and chemotherapy can include abnormally formed teeth, shortened or absent roots, missing teeth, abnormal eruption times, atrophy of pulps, and abnormal jaw growth (Fig. 9).

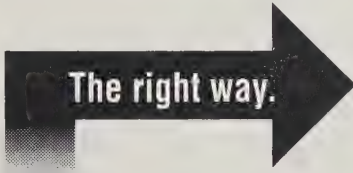
### Oral Management

Several studies<sup>4,5,6,7</sup> clearly indicate that dental evaluation and treatment prior to beginning cancer therapy minimize the risk of infections and hemorrhagic complications in the mouth. Each child should receive a dental examination shortly after being diagnosed with cancer, and the child's physician and parents should be consulted. Parents are frequently unaware of the oral complications of cancer treatment and have many questions that need to be addressed. Nursing staff and parents must understand the urgency of maintaining oral hygiene and restricting dietary sugar intake. Brushing should be encouraged after each vomiting episode. Sharp, hot and acidic foods should be avoided to prevent damage to the oral

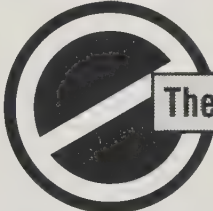
tissues. Dental restorations should be completed in consultation with the child's physicians, and the dentist should be made aware of the child's blood counts. Dental appointments should be kept short, as the child is usually chronically tired and unable to tolerate long appointments. Care should be taken to keep the overhead light from shining on the child for prolonged periods of time. The protective melanocytes are frequently neutralized by the chemotherapy, resulting in a child that is quite photosensitive.

It must be kept in mind that some oncology patients may require a bone marrow transplant, which leaves them particularly vulnerable to infection and unable to receive dental treatment during this stage of medical care. Therefore, any teeth that appear likely to abscess should be extracted, as should loose teeth (to remove a nidus for yeast growth and decrease the risk of hemorrhage). In addition, space maintainers should be removed, dental restorations completed and maintained, and oral hygiene kept at an optimal level. Seven to 10 days of healing should be allowed prior to continuing with chemotherapy or radiotherapy.

For children with normal mucosa and gingiva on diagnosis (of cancer), daily brushing and flossing is begun, and cariogenic foods are restricted. Baking soda may be used as a substitute if the usual toothpaste "burns." A daily brushing with a fluoride gel (0.4-0.5 percent) at bedtime provides for optimum protection. Saline rinses or Ora-rinse



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(Thompson-McKay Pharmaceuticals) should be done four times a day. Frequent hydration of the lips with moisturizing creams should be done throughout the day.

In addition to the above-mentioned protocol for normal mucosa and gingiva, children with mucositis on diagnosis (of cancer) should be started on a regimen of chlorhexidine gluconate (0.1 per cent) twice daily.<sup>7</sup> This is an antibacterial mouthwash that, unfortunately, stains the teeth yellow/brown, but the discoloration can be polished away. Some children require their teeth to be cleaned more frequently as a result of this staining. Commercial mouthwashes should be avoided due to their high alcohol content. Care should be taken to ensure that the child is old enough to rinse and expectorate.

One study by Wahlin showed that good oral hygiene was as effective as chlorhexidine rinsing.<sup>8</sup> Copious saline rinses should begin to help hydrate the mucosa, promote healing and minimize discomfort. Careful monitoring of the platelet levels must be done. When platelet levels bottom out, brushing is discontinued and the child begins using a spongy glycerine swab instead of a toothbrush.

Oral ulcerations require topical analgesics such as two per cent lidocaine or Ora-gel (Commerse Drug Co.) teething ointment and/or systemic analgesics. Oral analgesic rinses such as Tantum could be used to provide some relief. Saliva substitutes such as Xerolube or Moi-Stir (Kingswood Canada Inc.) help the child to swallow and lubricate his or her dry mouth.

## Summary

The development of oral complications during cancer therapy is not uncommon. The key to minimizing the problems is prevention, a solid understanding of the causes and manifestations of cancer treatment and a good working relationship with the child's oncologist/hematologist. Treatment of infections and dental decay should be undertaken, oral hygiene and diet restrictions implemented and supportive treatment provided while the child is undergoing cancer treatment.

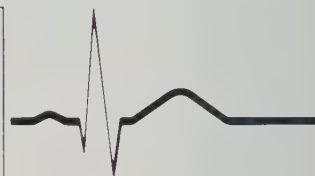
Dr. Mary Larissa Krywulak is the chief of dentistry at the Children's Hospital of Eastern Ontario, and an adjunct professor in the department of surgery at the University of Ottawa School of Medicine.

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## The Attitudes and Concerns of Canadian Dental Health Care Workers Toward Infection Control and the Treatment of AIDS Patients

*J. Hardie, BDS, M.Sc., FRCDC*

### Introduction

Infection with the human immunodeficiency virus (HIV) and the onset of the associated acquired immunodeficiency syndrome (AIDS) continue to be of concern to health care workers, their patients, government regulatory agencies and the media. Such genuine interest has produced a voluminous amount of valid, well documented and researched information on the basic scientific, epidemiological and clinical facets of HIV infection and AIDS.

Paradoxically, many myths, much misinformation, and even pervasive paranoia on these same topics are present among all levels of society. To what extent such suspicions have influenced the delivery of health care to HIV-infected AIDS patients is not known. What is known, however, is that all health care workers have been affected to varying degrees by recent recommendations on infection control practices.

In 1987, the first study was published on the attitudes of dentists toward AIDS patients. Since then, many similar reports have been released, often in conjunction with surveys depicting the changing pattern of the infection control procedures practised by dentists. In Canada, independent local or provincial surveys of this nature have been completed. This study is an attempt to undertake a survey with a national perspective.

### Method

During May and June 1991, the author presented a continuing education course called "HIV and Infection Control in the 1990s." The course, of four-hours duration, was presented twice in Vancouver, B.C., once in Victoria, B.C., and once in Ottawa, Ontario. As part of the registration procedure, participants were asked to complete an anonymous questionnaire.

To avoid confusion, respondents were asked to consider HIV-infected patients as AIDS patients. The first three questions were designed to obtain demographic material. The next 12 related to the respondents' experience with AIDS patients, their knowledge of AIDS and their concerns regarding the syndrome. Eight of these questions were yes/no in format, while the remaining four required an objective written response. The final five questions concerned infection control. Four were of the yes/no style, with one needing an objective written response.

The completed questionnaires were grouped according to the cities in which they were completed and further divided into four sub-headings – dentists, hygienists, assistants and others. (Others consisted of office managers and/or receptionists.) For each professional subgroup, the number of "yes" responses to each question was recorded and converted to a percentage. This figure

represents the percentage of the sub-group responding affirmatively to a particular question. A record was also made of each time the same objective response was given by a sub-group, permitting common responses to be identified. No further statistical analyses were conducted. The survey results were compared on an inter-group and inter-city basis, and also to results obtained in previously published surveys.

### Results

The 350 participants who attended the courses returned 212 questionnaires, a response rate of 60 per cent. **Fig. 1** depicts the questionnaire's format, while **Fig. 2** records the respondents' distribution by professional activity and city. Similarly, the percentage of individual professional groups per city and per total responses are illustrated in figures **3A** and **3B**, respectively. **Table I** shows the range and mean of the number of years in practice according to professional grouping and city. Of the yes/no questions, numbers 4, 5, 6, 8, 9 and 11 determine the experience of respondents in treating AIDS patients. Although question 8 is in four parts, responses to it were especially significant in determining how many dental care workers would routinely provide appropriate care to AIDS patients, while taking the necessary precautions. Positive responses to this

**TABLE I:**

### Range and Mean of Years in Practice

|                  | Dentists | Mean | Hygienists | Mean  | Assistants | Mean | Others | Mean |
|------------------|----------|------|------------|-------|------------|------|--------|------|
| <b>Vancouver</b> | 1-40     | 11.7 | 1-25       | 10.63 | 1-23       | 7.67 | 6-30   | 14.8 |
| <b>Victoria</b>  | 5-37     | 16.8 | 2-20       | 7.00  | 1-22       | 7.44 | 9-24   | 14.2 |
| <b>Ottawa</b>    | 4-28     | 11.6 | 1-19       | 8.84  | 1-20       | 4.57 | 1-15   | 8.3  |



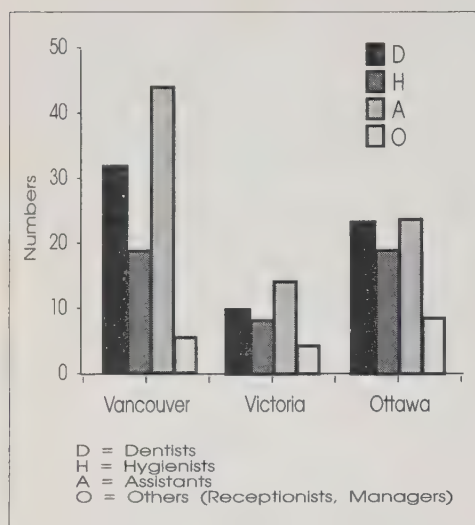


Fig. 2 : Professional activity and city

question and the others listed above are illustrated, by per cent, in Table II. Questions 13 and 14 are designed to assess knowledge of AIDS. Positive responses to these questions are depicted by per cent in Table III. Infection-control practices are assessed through the responses to questions 16, 17, 18 and 19, and shown by per cent in Table IV. Again, it should be noted that the responses to the multiple parts of question 17 – a) do you wear gloves? and, b) do you wear gloves only when performing intra-oral procedures and/or handling dirty instruments? – were extremely significant. The responses to question 18 – a) is there a heat sterilizer in the office? and, b) has it been tested for effectiveness? – also given in Table IV, are similarly significant. The remaining elements of question 18 relate to the type of sterilizer, the frequency of monitoring and the type of monitoring. Responses are recorded by per cent in

tables Va, b and c.

The remaining questions required written subjective responses. Common answers to each question are recorded in tables VI-X.

## Discussion

An examination of figs. 2, 3A and 3B indicates some similarities in the distribution of respondents from each city. In general, for each city, 70 per cent were assistants, hygienists or others (receptionists and office managers). Assistants were the most numerous element of this group, with approximately twice as many assistants as hygienists, and twice as many hygienists as others. Dentists made up about 30 per cent of total respondents, which contrasts with the 20 per cent figure recently reported by Cunningham.<sup>1</sup> An analysis of Table I illustrates remarkable similarities in the range and the mean of years in practice among the four groups from all

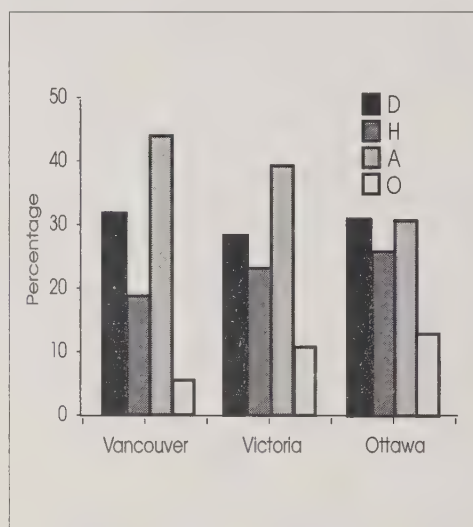


Fig. 3A: Percentage of professional groups according to city

three cities.

This demographic material suggests that the audiences in each city were similar from the perspective of professional activity and experience, thus justifying the validity of comparing and contrasting their responses to the questionnaire.

Approximately 50 per cent of the dentists were aware of AIDS patients attending their practices, with a similar percentage admitting to treating such patients. This contrasts dramatically with a survey of Ottawa dentists published in 1987,<sup>2</sup> which indicated that 85 per cent of the responding dentists were not aware of AIDS patients attending their practices, with only 21 per cent having treated such patients. It also contrasts with a 1990 survey by Dove and Cottone<sup>3</sup> in which 16 per cent of Texas dentists had knowingly treated AIDS patients. A surprising result of the present study is the low percentage of

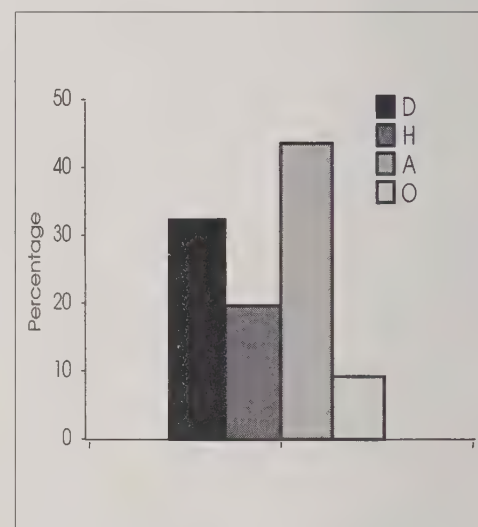


Fig. 3B: Percentage of professional groups per total response

TABLE II:

## Per Cent Experience With AIDS Patients

| Questions                          | Vancouver |    |    |     | Victoria |    |    |     | Ottawa |    |    |     |
|------------------------------------|-----------|----|----|-----|----------|----|----|-----|--------|----|----|-----|
|                                    | D         | H  | A  | O   | D        | H  | A  | O   | D      | H  | A  | O   |
| 4. AIDS patient attending practice | 42        | 58 | 47 | 40  | 30       | 38 | 19 | 50  | 61     | 53 | 48 | 89  |
| 5. Treated AIDS patient            | 45        | 58 | 51 | 20  | 40       | 38 | 31 | 50  | 65     | 42 | 52 | 78  |
| 6. Refused to treat AIDS patient   | 19        | 16 | 9  | 0   | 0        | 13 | 0  | 0   | 9      | 0  | 0  | 22  |
| 8i Provide care with precautions   | 87        | 68 | 73 | 100 | 90       | 75 | 94 | 100 | 70     | 84 | 74 | 100 |
| 9. Have concerns Re: AIDS patients | 58        | 68 | 71 | 20  | 40       | 50 | 44 | 50  | 74     | 63 | 65 | 100 |
| 11. Colleagues have concerns       | 70        | 84 | 60 | 60  | 70       | 88 | 38 | 75  | 83     | 89 | 91 | 78  |



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TABLE III:

## Per Cent Knowledge Of Aids

| Questions                        | Vancouver |    |    |     | Victoria |    |    |     | Ottawa |    |    |     |
|----------------------------------|-----------|----|----|-----|----------|----|----|-----|--------|----|----|-----|
|                                  | D         | H  | A  | O   | D        | H  | A  | O   | D      | H  | A  | O   |
| 13. i -Mode of Transmission      | 87        | 84 | 80 | 100 | 100      | 75 | 81 | 100 | 83     | 95 | 91 | 100 |
| ii -Systemic Signs               | 71        | 79 | 33 | 60  | 60       | 75 | 44 | 25  | 91     | 74 | 34 | 33  |
| iii -Oral Signs                  | 81        | 74 | 33 | 40  | 70       | 63 | 31 | 25  | 87     | 53 | 21 | 11  |
| iv -Appropriate Oral Care        | 81        | 53 | 58 | 40  | 90       | 50 | 81 | 100 | 52     | 68 | 91 | 55  |
| v - From Family                  | 81        | 63 | 60 | 80  | 100      | 75 | 69 | 100 | 87     | 95 | 65 | 33  |
| - From Staff                     | 77        | 58 | 47 | 60  | 100      | 63 | 56 | 100 | 87     | 84 | 61 | 33  |
| - From Non-AIDS Patients         | 77        | 58 | 53 | 80  | 100      | 63 | 63 | 100 | 83     | 84 | 65 | 22  |
| 14. -Course on AIDS in last year | 42        | 42 | 13 | 40  | 50       | 38 | 19 | 50  | 65     | 32 | 13 | 11  |

dentists who would refuse treatment to AIDS patients. In Vancouver, 19 per cent would not treat, in Ottawa the figure is nine per cent, while in Victoria none of the dentists would deny treatment. This suggests that, on average, more than 80 per cent of dentists would be willing to treat AIDS patients. In the U.S., according to a study by Sadowsky and Kunze,<sup>14</sup> only 60 per cent of dentists are willing to treat such individuals. Other current studies report figures of 27 per cent,<sup>5</sup> 21 per cent,<sup>6</sup> 31 per cent<sup>7</sup> and 44 per cent.<sup>7</sup>

In this survey, the AIDS experiences of hygienists and assistants tended to parallel those of dentists. This was expected. The receptionists and office managers in Victoria and Vancouver were more aware of AIDS patients attending their practices, and receiving treatment, than their colleagues in Ottawa. A variable finding is that while all of the Ottawa hygienists and assistants and all of the Victoria assistants would treat AIDS patients, 13 per cent of the Victoria hygienists, 16 per cent of the Vancouver hygienists, nine per cent of the Vancouver assistants and 22 per cent of the Ottawa receptionists and managers would refuse to perform such treatment.

While there are no similar surveys to which these responses can be compared, a 1988 report by Gerbert and co-workers<sup>8</sup> suggested that 70 per cent of dental health workers – including hygienists and assistants – would prefer to refer rather than treat persons at risk for AIDS. The present study reveals that dentists refusing to treat AIDS patients

generally base this decision on staff resistance and the failure of patients to reveal an HIV positive status. The hygienists' refusal is related to their personal preference not to treat AIDS patients, and their belief that such persons should be referred to hospitals. This sentiment is shared by the few assistants who refuse to provide care. Assistants are also worried about improperly equipped operatories, a concern shared by office managers and receptionists. Nevertheless, from an attitudinal perspective it appears that when appropriate precautions are taken, approximately 80 per cent of dentists, hygienists and assistants and 100 per cent of receptionists and managers would provide care to AIDS patients. This willingness to provide care exists despite the personal concerns that approximately 74 per cent of the members of all four groups of dental professionals expressed about AIDS patients. The most common concern involves a fear of HIV transmission during dental treatment, or infection via needlestick-type injuries from contaminated instruments or inanimate objects such as light handles, pens, charts and counter tops. In addition, dentists, hygienists, assistants and others share the belief that all of the routes by which HIV can be transmitted have not been elucidated, thus increasing their risk of being infected with the virus. Two other concerns expressed almost exclusively by dentists relate to the stigma of being known as the "AIDS" dentist, and staff resistance to accepting AIDS patients. The other groups of dental care personnel appear

to agree that doubts concerning the effectiveness of infection control techniques, and the tendency for infected patients not to reveal their HIV status, are significant factors influencing their willingness to treat persons with AIDS.

The respondents indicate that where their colleagues are reluctant to treat AIDS patients – a position that is often based on ignorance or misinformation about HIV infection and/or AIDS – they express a wariness and confusion about the effectiveness and utilization of recommended infection control procedures. A list of the common reservations expressed by the participants in this survey includes:

- Personal safety
- Staff resistance
- Stigma
- Questionable infection control practices
- Non-disclosure of HIV status by infected individuals.

This list is similar to the concerns expressed during a 1987 survey of Ottawa dentists,<sup>2</sup> and to surveys conducted in 1988<sup>8</sup> and in 1990.<sup>3,5</sup> Such a finding adds credence to the concept that Canadian dental workers and their colleagues in the United States have the same reservations about providing treatment to AIDS patients.

A certain consistency exists as to the respondents' knowledge of AIDS. Overall, 83 per cent of dentists believe that they have sufficient knowledge of AIDS to appreciate the methods of transmission, recognize systemic and oral signs, provide appropriate care and answer questions on the topic from family, staff



TABLE IV:

## Per Cent Infection Control Practices

| Questions                            | Vancouver |     |    |     | Victoria |     |    |     | Ottawa |    |    |    |
|--------------------------------------|-----------|-----|----|-----|----------|-----|----|-----|--------|----|----|----|
|                                      | D         | H   | A  | O   | D        | H   | A  | O   | D      | H  | A  | O  |
| 16. Understand Universal Precautions | 77        | 74  | 78 | 80  | 60       | 100 | 63 | 100 | 87     | 74 | 74 | 66 |
| 17. Wear Gloves while working        | 97        | 95  | 96 | 60  | 90       | 100 | 94 | 50  | 87     | 75 | 96 | 55 |
| ii Intraorally and/or instruments    | 45        | 68  | 78 | 80  | 40       | 63  | 81 | 75  | 39     | 68 | 78 | 33 |
| 18. i Heat Sterilizer                | 100       | 100 | 93 | 80  | 100      | 100 | 94 | 100 | 100    | 95 | 96 | 78 |
| ii Tested For Effectiveness          | 61        | 84  | 69 | 80  | 100      | 88  | 69 | 100 | 83     | 63 | 83 | 66 |
| 19. Hepatitis B Vaccine              | 94        | 84  | 71 | 100 | 90       | 100 | 69 | 100 | 100    | 89 | 91 | 33 |

and non-AIDS patients. This contrasts with the previous survey of Ottawa dentists<sup>2</sup> in which 64 per cent and 61 per cent respectively were unfamiliar with the systemic and oral signs of AIDS, but does compare with the 85 per cent of Ottawa dentists<sup>2</sup> who were aware of the routes of transmission. Other studies to test dentists' knowledge of AIDS have produced results similar to those of the present study. In 1987, Gerbert<sup>9</sup> reported that 99 per cent of dentists identified the high risk lifestyles associated with AIDS. In Dove and Cottone's 1990 survey,<sup>3</sup> 77 per cent of dentists demonstrated an acceptable knowledge of AIDS, while in Samaranayake and co-workers survey,<sup>10</sup> 89 per cent of dental faculty members and final year students correctly identified the common oral signs of AIDS. In the present study, 81 per cent of Vancouver dentists and 90 per cent of Victoria dentists indicated they have sufficient knowledge of AIDS

to provide appropriate care. This contrasts with the situation in Ottawa, where 52 per cent of dentists believe they have sufficient information. Overall, however, these responses do compare with Rydman et al's study<sup>5</sup> in which 87 per cent of dentists believed they had adequate training, and contrast with the previous Ottawa study<sup>2</sup> and Gerbert's survey<sup>9</sup> in which 67 per cent and 57 per cent of dentists, respectively, admitted to having an insufficient knowledge of AIDS to provide appropriate care. An interesting finding of the present study is that although more Ottawa dentists have an insufficient knowledge of AIDS compared to their Vancouver and Victoria colleagues, more of them (65 per cent) have knowingly treated AIDS patients than Vancouver (45 per cent) and Victoria (40 per cent) dentists.

The responses of the other dental care workers indicate that 89 per cent are familiar with the accepted routes of AIDS transmission. In general, hygienists are more knowledgeable about the systemic and oral signs than assistants, and appear more prepared to answer

questions on the topic than assistants. However, 77 per cent of assistants believe that they have the appropriate knowledge to provide care, compared to 57 per cent of hygienists. This may be a reflection of the fact that assistants work in tandem with dentists while hygienists operate in a more independent manner. As a group, the responses of the managers and receptionists are the most inconsistent. For example, the managers/receptionists from Victoria have a 100 per cent response rate to five of the seven questions in this section, although only a quarter of them admit to some knowledge of the systemic and oral signs of AIDS. Similarly, while in general more than 50 per cent of the Vancouver and Victoria managers and receptionists are knowledgeable about most facets of AIDS, less than 50 per cent of their Ottawa colleagues have similar information. Unfortunately, there are no other published surveys against which the responses of the hygienists, assistants, receptionists and managers may be compared or contrasted.

As a group, more dentists (52 per

TABLE V a:

## Type of Sterilizer

| Type                                                                                | %  |
|-------------------------------------------------------------------------------------|----|
| C                                                                                   | 58 |
| A                                                                                   | 28 |
| A/C                                                                                 | 5  |
| H                                                                                   | 3  |
| TOTAL = 212                                                                         |    |
| C = Chemiclave<br>A = Autoclave<br>A/C = Autoclave + Chemiclave<br>H = Hot Air Oven |    |

TABLE V b:

## Frequency of Monitoring

| Number                                 | M   | W   | D   |
|----------------------------------------|-----|-----|-----|
| 123                                    | 62% | 14% | 24% |
| 212                                    | 36% | 8%  | 14% |
| M = Monthly<br>W = Weekly<br>D = Daily |     |     |     |

TABLE V c:

## Type of Monitoring

| Number                   | B   | T   |
|--------------------------|-----|-----|
| 152                      | 68% | 32% |
| 212                      | 48% | 23% |
| B = Biologic<br>T = Tape |     |     |



cent) have attended a continuing education course on AIDS in the last year than have hygienists (37 per cent), assistants (15 per cent) and managers/receptionists (34 per cent). This is different from the information offered by Cunningham.<sup>1</sup> He suggested a ratio of 2 - 1 of dental auxiliaries attending continuing education courses as compared to dentists. In the present study, however, dentists may have included local, provincial and national dental association meeting or convention presentations on AIDS as bona fide courses, whereas the Cunningham<sup>1</sup> study may have related only to attendance at formally sponsored dental faculty continuing education courses. In the Ottawa survey of 1987,<sup>2</sup> only 36 per cent of dentists had attended a course on AIDS during the previous year. This contrasts with the present study in which 65 per cent of Ottawa dentists, 42 per cent of Vancouver dentists and 50 per cent of Victoria dentists had been to such a course. The most common reason given by all participants for attending a course was to obtain more information on all aspects of AIDS and related conditions. A few respondents suggested having a renewed interest in the topic because of recent allegations relating AIDS acquisition to dental treatment.<sup>11</sup>

The concept of universal precautions is - according to the current survey - understood by 78 per cent of all respondents. In other words, 22 per cent of dental care workers do not appreciate this approach to infection control. On average, 87 per cent of the dentists admit to wearing gloves while working. This is in contrast to earlier Canadian surveys, which recorded a three per cent utilization rate in 1984<sup>12</sup> and a one per cent utilization rate in 1985,<sup>13</sup> but compares with the 72 per cent of dentists who reported always wearing gloves in a 1988 Canadian report.<sup>13</sup> Other earlier reports on gloves reveal low utilization rates. In a 1982<sup>14</sup> report the figure was 11 per cent, in 1983<sup>15</sup> it was nine per cent and in 1986<sup>16</sup> 23 per cent. Although a dental products report<sup>17</sup> in 1987 indicated a 27 per cent utilization rate, a survey published in the same year by Gerbert<sup>9</sup> showed that 80 per cent of general practitioners were routinely using gloves. A 1989 national survey of U.S. dentists<sup>16</sup> reported a 76 per cent utilization rate, while Samaranayake and colleagues<sup>10</sup> indicated that 93 per cent of the faculty and students in Los Angeles, California, regularly wore gloves compared to 51 per cent of the faculty and students in Glasgow, Scot-

**TABLE VI:**

**Reasons for Refusing to Treat AIDS Patients**

| Reasons                      | Group |
|------------------------------|-------|
| 1. Staff Resistance          | D     |
| 2. Improperly equipped       | A O   |
| 3. Refer to Hospital         | H A   |
| 4. Personal Preference       | H     |
| 5. Non -Disclosure of Status | D     |

**TABLE VII:**

**Personal Concerns Regarding AIDS Patients**

| Concerns                  | Group   |
|---------------------------|---------|
| 1. Personal Safety        | D H A   |
| 2. Unknown Transmission   | D H A O |
| 3. Infection Control      | H A O   |
| 4. Stigma                 | D O     |
| 5. HIV Status of Patients | H A O   |
| 6. Staff Resistance       | D       |

**TABLE VIII:**

**Colleagues Concerns Regarding AIDS Patients**

| Concerns                     |
|------------------------------|
| 1. Staff Resistance          |
| 2. Ignorance, Misinformation |
| 3. Infection Control         |
| 4. Homophobia                |

land. Although the present study seems to indicate a higher rate of glove utilization than reported in previous Canadian studies, only 41 per cent of dentists reported using gloves when performing intra-oral procedures and/or handling contaminated instruments. Since these are the significant occasions during which gloves should be worn, it is possible that while more dentists are wearing gloves, they may be doing so inappropriately. It is also possible that the format of the question might have led to some confusion among the respon-

**TABLE IX:**

**Significant Reasons for Attending Course**

| Reasons               |
|-----------------------|
| 1. Personal Education |
| 2. Staff Education    |
| 3. Florida Case       |

dents.

The present study indicates that 90 per cent of hygienists and 95 per cent of assistants use gloves while working. This is in marked contrast to a 1984 survey<sup>12</sup> in which three per cent reported using gloves and a 1987 report<sup>18</sup> on Ontario hygienists in which 21 per cent were found to wear gloves. The figures from the present study do compare with those of 98 per cent and 81 per cent for hygienists and assistants as reported by Gerbert<sup>8</sup> and co-workers in 1988. There is a discrepancy between



**TABLE X:****Concerns Regarding Infection Control**

| Concerns                                      |
|-----------------------------------------------|
| 1. Effectiveness of Infection Control Methods |
| 2. Waste Products                             |
| 3. Aerosols                                   |
| 4. Professional and Media Reaction            |
| 5. Lack of Government Regulations             |

the reported wearing of gloves by hygienists and assistants compared to the numbers wearing gloves only to perform intra-oral procedures and/or handle contaminated instruments. This figure is 66 per cent for hygienists and 79 per cent for assistants. Although higher than the comparable figure for dentists, similar interpretative comments apply. It is not known why office managers and receptionists would be wearing gloves while performing administrative tasks, therefore it is assumed that from time to time they participate in clinical activities.

According to the responding dentists, 100 per cent have heat sterilizers in their office. This is similar to the figure obtained in a 1988 Canadian survey.<sup>13</sup> The hygienists report that 98 per cent have access to heat sterilizers, which is slightly higher than the 90 per cent figure recorded in 1987,<sup>18</sup> while the figure for assistants is 94 per cent. The reason for this figure being less than 100 per cent may be that some of the responding assistants work in specialty practices, where heat sterilization may not be deemed mandatory. The chemi-clave sterilizer appears to be more common by a ratio of approximately 2-1 than the autoclave. Although the number and type of sterilizers are significant, it is essential to test the effectiveness of these instruments. The current survey indicates that 81 per cent of dentists are aware of some testing being performed, in contrast to 23 per cent reporting a similar awareness in 1988.<sup>13</sup> A 1989 U.S. survey<sup>16</sup> demonstrated monitoring by 67 per cent of dentists. On average, 76 per cent of hygienists and assistants report sterilizer testing, as opposed to 40 per cent of hygienists in 1987.<sup>18</sup> Not all respondents indicate the frequency of monitoring, but of the 123 who do, 62 per cent report monthly testing, 14 per cent weekly testing and 24 per cent daily testing. Of the 152 who

identify the type of monitoring, 68 per cent use biologic tests and 32 per cent use autoclave tape. All daily testing is done by autoclave tape. Biologic monitoring was used by 21 per cent of dentists in the U.S. according to a 1989 study.<sup>16</sup>

The percentage of respondents utilizing the hepatitis B vaccine is: dentists 95 per cent, hygienists 91 per cent, assistants 77 per cent, and others 77 per cent. (Note: It is not known why only a third of the reporting managers and receptionists have been vaccinated.) In the 1988 survey,<sup>13</sup> 71 per cent of dentists had received the hepatitis B vaccine, while in 1987,<sup>18</sup> 56 per cent of hygienists had been immunized. According to a 1989 U.S. report,<sup>16</sup> in 1983 17 per cent of dentists had been vaccinated for hepatitis B, with that figure increasing to 60 per cent in 1988. The figures for hygienists were 40 per cent in 1986 and 56 per cent in 1988.

The final subject covered by the current survey related to the respondents' concerns with regards to infection control. While a variety of concerns are indicated, overall they are similar among each professional group and to concerns previously mentioned in regard to AIDS. Common anxieties focus on many aspects of infection control, from the effectiveness of gloves to the disinfection of non-autoclavable instruments. There is also concern over the inconsistencies in current recommendations regarding the handling of waste products, as well as over whether these products are a source of infection. Many of the respondents are worried that the aerosols produced during dental procedures are a source of disease transmission – especially of HIV infection. Others are emphatic that an overreaction by the profession, combined with media hyperbole, has resulted in paranoia and misinformation, creating a market that is ripe for unscrupulous commercial ex-

ploitation. Finally, general ambivalence is expressed regarding the need for additional government regulations, apart from the establishment of criteria relating to disinfectants.

**Conclusions**

To date, there has been no national assessment of the attitudes of Canadian dental health care workers toward AIDS patients nor any determination of changes in their infection control practices. This study is an attempt to fill such a void by comparing and contrasting the responses of dental professionals from three geographic locations. However, the survey does have inherent faults. It is based on the responses of attendees at a continuing education course and cannot be construed as being representative of a random national sample. The respondents may have completed the questionnaire before, during or immediately after the course and may have been influenced by it. In addition, the questionnaire relied upon self-reporting by the respondents. The responses obtained using this type of technique can reflect perceived or expected responses. Finally, the survey findings were not subject to detailed statistical analyses. Nevertheless, the similarity of the responses between each city and each professional group, combined with the appreciation that the findings are not dissimilar to results obtained by recent, more sophisticated U.S. studies, suggests that the current survey does, to some extent, present a perspective upon the attitudes and practises of Canadian dental health workers towards AIDS patients and infection control.

It does appear, therefore, that at least 80 per cent of Canadian dentists and their auxiliaries have a positive attitude toward AIDS patients and would provide care to them. In addition, most dental personnel consider themselves to be reasonably knowledgeable on most aspects of AIDS, and to have implemented significant infection control recommendations. For example, compared to previous, similar studies, in the last few years there have been dramatic increases in the numbers of Canadian dental personnel who routinely wear gloves, are aware of sterilizer testing and have been immunized against hepatitis B.

Paradoxically these findings exist even though dentists and their co-workers express numerous reservations about AIDS and the efficacy of infection control procedures. It may be that this dilemma represents the frus-



trations of concerned dental workers who are attempting to balance professional obligations against personal fears and anxieties. This state will continue until the obvious need for more pertinent education on AIDS and related topics is met.

The present survey has identified the concerns which, to varying degrees, affect the treatment of AIDS patients by Canadian dentists and their auxiliaries. These anxieties may be resolved if addressed in an informed manner. Such an undertaking will be the objective of two follow-up articles.

## Summary

This survey indicates that while the majority of Canadian dental personnel would treat AIDS patients, they are concerned about the transmission of the causative agent and the efficacy of recommended infection control procedures. It is believed that a frank discussion of these reservations and anxieties is essential if dentists and their auxiliaries are to treat AIDS patients in an effective, comfortable manner.

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## AIDS and Infection Control Questionnaire

### Explanation

To simplify the analysis of the answers, please consider all patients with evidence of HIV (human immunodeficiency virus) infections to be AIDS patients. This will include asymptomatic HIV infected patients, ARC (AIDS related complex) patients, and symptomatic, medically diagnosed AIDS patients.

1. Number of years in practice?
2. Type of practice? General ☐ Specialty ☐
3. Position? Dentist ☐ Hygienist ☐ Receptionist ☐  
Assistant ☐ Other ☐
4. Are you aware of an AIDS patient (see note above) attending your practice? Yes ☐ No ☐
5. Have you provided dental care to an AIDS patient? Yes ☐ No ☐
6. Have you refused to provide dental care to an AIDS patient? Yes ☐ No ☐
7. If yes to 6, please state reasons.
8. If a patient admits to having AIDS, do you or would you in your practice:
  - i Routinely provide the appropriate care, taking necessary precautions? Yes ☐ No ☐
  - ii Routinely conduct an examination but refer to another colleague for treatment? Yes ☐ No ☐
  - iii Routinely dismiss the patient without an examination or referral? Yes ☐ No ☐
  - iv Routinely refer without an examination or referral? Yes ☐ No ☐
9. Do you have reservations or concerns regarding treating AIDS patients? Yes ☐ No ☐
10. If yes, please list them —
11. Have you or your office colleagues expressed concerns regarding AIDS patients? Yes ☐ No ☐
12. If yes, please list them if different from #10 above.
13. Do you believe that you have sufficient knowledge of AIDS to:
  - i appreciate its mode of transmission? Yes ☐ No ☐
  - ii recognize the general systemic signs? Yes ☐ No ☐
  - iii recognize the specific oral signs? Yes ☐ No ☐
  - iv offer AIDS patients appropriate dental care? Yes ☐ No ☐
  - v answer questions on AIDS from:
    - i your family? Yes ☐ No ☐
    - ii your staff? Yes ☐ No ☐
    - iii non-AIDS patients? Yes ☐ No ☐
14. Within the last year, have you attended a continuing education course on AIDS? Yes ☐ No ☐
15. What do you consider to be the most significant reason(s) for attending this course?
16. Do you understand the idea of "Universal Precautions" as it applies to Infection Control? Yes ☐ No ☐
17. Do you wear gloves while working? Yes ☐ No ☐
  - i constantly throughout the working day? Yes ☐ No ☐
  - ii only when performing intra oral procedures? Yes ☐ No ☐
  - iii only when handling dirty instruments or equipment? Yes ☐ No ☐
  - iv a combination of ii and iii Yes ☐ No ☐
18. Is there a heat sterilizer in the office? Yes ☐ No ☐
  - i If yes, what type? Autoclave ☐ Chemiclave ☐  
Hot Air ☐ Other ☐
  - ii Has it been tested for effectiveness? Yes ☐ No ☐
  - iii If yes, how often? Daily ☐ Weekly ☐ Monthly ☐  
Other ☐
  - iv If yes, what method used? Autoclave tape ☐  
Biologic Monitoring ☐ Other ☐
19. Have you received the Hepatitis B vaccination? Yes ☐ No ☐

Fig. 1: Questionnaire completed by course participants



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## Management of xerostomia

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### ABSTRACT

*Xerostomia (dry mouth) is an unpleasant condition that is common after radiotherapy to the head and neck, although it may have other causes. A review of the management of xerostomia, as well as the prevention and management of the oral soft tissue and dental complications resulting from xerostomia, is provided.*

### SOMMAIRE

*Bien qu'elle puisse avoir d'autres causes, la xérostomie (diminution de la salivation) est une affection désagréable qui est fréquente après une irradiation de la tête et du cou. Cet article traite de sa gestion, de la façon de la prévenir ainsi que de la gestion des tissus mous de la bouche et des complications dentaires qui peuvent suivre.*

### Introduction

Xerostomia is an unpleasant symptom that has many causes. Where possible, the underlying cause should be treated. Otherwise, xerostomia may be managed initially by stimulating salivary gland function. The use of saliva substitutes should only be considered when gland function cannot be stimulated. Furthermore, when gland function cannot be improved, complications such as dental caries and mucosal, salivary and periodontal infections must be prevented and controlled.

#### 1. Stimulation of Saliva Production

In patients with drug-induced xerostomia, changing the prescribed medication(s) may accomplish some improvement in saliva production. In others, salivary gland function may be stimulated mechanically, by taste stimuli, or by drugs.

Sugar-free gum or candies are useful stimuli. Drugs that may be effective include cholinergic agents (Table I). Pilo-

carpine, given as ophthalmic drops placed intra-orally, is effective in doses of up to five mg administered three times daily.<sup>1-4</sup> Anetholetrithione (Sialor (Herdt and Charton, Montreal)), which acts by increasing the number and concentration of the salivary gland receptor sites for neurostimuli,<sup>5</sup> can increase saliva production in xerostomic patients<sup>6-8</sup> unless there is such advanced dysfunction that the gland has virtually ceased to produce saliva.<sup>9-11</sup> The usual dose of anetholetrithione is one to two tablets three times daily. A study of radiation patients with xerostomia showed that the combined use of pilocarpine and anetholetrithione resulted in increased saliva production in individuals who had failed to show improvement following the use of a single agent.<sup>8</sup>

It has been suggested that stimulating the salivary glands prior to initiating cancer therapy may be of value in reducing the therapy's impact on the glands,<sup>4,12,13</sup> but thorough double blind trials have not been conducted. The preliminary results of a prospective study using pilocarpine during radiotherapy are encouraging, however.<sup>4</sup>

Before sialogogues are prescribed, it is important that the possible drug interactions and side-effects are understood.<sup>7,8,13-18</sup> For example, pilocarpine has the potential to cause adverse ef-

fects on cardiovascular, pulmonary, and gastrointestinal function. In the case of Sialor, the principal complication is that of gastrointestinal upset.

#### 2. Symptomatic Management of Xerostomia

Individuals with a dry mouth will frequently sip water, particularly during eating, and need to keep water by their bedside for use at night. Several saliva substitutes or mouth-wetting agents are now marketed. Most contain carboxymethylcellulose, although there are some that contain animal mucins, and some also contain constituents that may facilitate the remineralization of enamel.<sup>19,20</sup> While some patients find these products useful, clinical experience suggests that they are not always well accepted.<sup>19</sup> Some studies have suggested that mucin-containing preparations are better accepted by patients<sup>21-23</sup> and may also promote the establishment of a "normal" oral flora.<sup>24</sup> However, when cost and convenience are taken into consideration, many patients prefer simply to frequently sip water or to use an aerosol pump of water.

Xerostomia patients should be given dietary instruction, cautioning them against foods that contain sugar, alcohol, caffeine or spices (which worsen

TABLE I:

#### Sialogogues

| Medication        | Formulation                    | Dosage                                  |
|-------------------|--------------------------------|-----------------------------------------|
| Pilocarpine<br>52 | Ophthalmic drops<br>1%, 2%, 4% | 2-4 drops on<br>tongue<br>4 times daily |
|                   | capsules (2-5mg)*              | *5mg,<br>3 times daily                  |
| Sialor            | Tablets (25mg)                 | 1-2 tablets<br>3 times daily            |

\* Capsules can be provided by some pharmacies.



TABLE II:

## Topical Antifungal Medications

| Polyenes        | Formulations                    | Frequency of daily Application |
|-----------------|---------------------------------|--------------------------------|
| Nystatin        | Rinse, cream<br>vaginal tablets | 2-4 times                      |
| <b>Azoles</b>   |                                 |                                |
| Miconazole      | cream, vaginal tablets          | 2-4                            |
| Clotrimazole    | cream, vaginal tablets          | 2-4                            |
| Ketoconazole*   | cream, suspension*              | 2-4                            |
| Chlorhexidine** | 0.12 - 0.2% rinse**<br>1-2% gel | 2-4                            |

\*Suspension available for systemic dosing, while may be used as a rinse. No studies of topical effects of rinsing have been published.

\*\*Topical products can be provided by some pharmacies, no commercial gel product available in Canada.

the xerostomia or irritate the mucosa) to reduce the risk of caries and candidiasis.<sup>13,18</sup>

In some cases, the patient's lips may become dry, atrophic and susceptible to cracking. It is preferable to treat this condition with a water-based lubricant or a lanolin-based product rather than one containing petroleum-derived lubricants (eg: Vaseline) which, used on a chronic basis, may promote further atrophy of epithelial cells and the growth of microorganisms.

### 3. Management of Candidiasis

Xerostomia increases candida carriage and the prevalence of candidiasis. In most cases, topical therapies will be sufficient in order to manage the candidiasis<sup>25</sup> (Table II). The most effective forms of topical medication are those with substantivity that remain in contact with the oral tissues for long periods of time. Topical antifungals are available as tablets which can be allowed to dissolve intraorally, with the antifungal agents remaining in contact with the mucosa while the tablets dissolve. Unfortunately, these oral tablets tend to be sugar-sweetened, and it is important to avoid sucrose-sweetened products where natural teeth are present. It has therefore become common practice to use vaginal antifungal tablets intraorally, as they are not sucrose-sweetened. However, if the patient's mouth is extremely dry, the tablets may not dissolve, and in these cases liquid products are best.

The polyenes, nystatin and amphotericin, bind to membrane sterols in fungal cell membranes and damage the cell membrane – leading to the death of the micro-organisms.<sup>26</sup> Nystatin is perhaps the most common of these drugs, and is available in an oral suspension, oral and vaginal tablets, and cream. Applications of nystatin four times daily are often needed to clear oral candidiasis, and treatment should be continued for at least two weeks to reduce the risk of recurrence.<sup>25</sup> Topical nystatin may cause nausea, particularly in patients receiving cancer therapy. Despite its efficacy in controlling many of the conditions associated with xerostomia, topical nystatin has not been shown to prevent oropharyngeal candidiasis in immunocompromised cancer patients.<sup>26-32</sup> Amphotericin is not available in a topical formulation in North America, and is therefore used systemically, but nephrotoxicity precludes its use in most patients with xerostomia.

The azole compounds are a group of synthetic agents<sup>26</sup> that change fungal membrane permeability by affecting cytochrome p-450 mediated ergosterol synthesis,<sup>33-37</sup> and are more potent than nystatin. Until recently, the azoles have only been available as topical agents such as creams and tablets (miconazole, clotrimazole, econazole).<sup>36-38</sup>

Ketoconazole was the first oral systemic agent with broad antifungal activity to be developed and is still used in outpatient systemic antifungal therapy.<sup>32,35,39,40</sup> When prescribing ketoconazole, however, it must be remembered that gut absorption requires an acid pH, and thus it is important for patients to take the drug after food. Ketoconazole is hepatotoxic – although this appears to be rare.<sup>41,42</sup>

Fluconazole is less toxic than ketoconazole, is water soluble (and thus better absorbed in the gut), has a high bioavailability, and has a longer plasma half-life than ketoconazole.<sup>34,43-45</sup> It has proved effective against oropharyngeal candidiasis in medically compromised patients, although only approximately half of the patients became culture negative for candida.<sup>43-45</sup>

Chlorhexidine, used in aqueous solution as a mouthrinse, has both an antibacterial and antifungal effect,<sup>25,46-58</sup> and there may be advantages to its use in dentate patients due to it having some effect against cariogenic bacteria.

Chlorhexidine, used in aqueous solution as a mouthrinse, has both an antibacterial and antifungal effect,<sup>25,46-58</sup> and there may be advantages to its use in dentate patients due to it having some effect against cariogenic bacteria.

### 4. Management of Caries Risk

Dietary analysis and counselling are mandatory in patients with xerostomia in view of the high risk of dental caries. In particular, the frequency of sucrose intake must be reduced. The patient should be counselled on which products are sugar-free and on how to avoid some of the problems associated with the use of other sweetened products. Oral hygiene must also be meticulous.

Chlorhexidine rinses have been shown to reduce the cariogenic flora, and thus the caries risk.<sup>59-62,64,65</sup> *Streptococcus mutans* appears to be more susceptible to chlorhexidine than lactobacilli.<sup>59,63,64</sup> However, in patients who have been treated with radiotherapy for head and neck cancer, it is the lactobacillus species rather than *Streptococcus mutans* that have been shown to be correlated with caries risk,<sup>63</sup> even though increases in both the *Streptococcus mutans* and lactobacillus counts occur in these cases.<sup>66,67</sup>

Chlorhexidine gel reduces both *Streptococcus mutans* and lactobacilli, when the gel is applied in a mouth-guard carrier.<sup>59</sup> Daily fluoride gel applications during radiotherapy, followed by 0.05 per cent sodium fluoride (NaF) rinses are reported to be caries protective.<sup>67</sup> A regime of chlorhexidine rinses (0.2 per cent) and NaF rinses (0.05 per cent) will usually control *Streptococcus mutans*, but the application of chlorhexidine gel (one per cent) may also be necessary when counts of these organisms are high.<sup>66</sup> Further studies are required in this special patient population at high risk.

Topical fluorides reduce caries risk



by reducing demineralization and by increasing remineralization.<sup>68-76</sup> In patients with xerostomia, the fluoride levels obtained after topical therapy increase more dramatically and remain higher for a longer period than those of patients with normal saliva production.<sup>76</sup> The reduced fluoride clearance in xerostomia should therefore enhance the clinical benefit of fluoride treatment. Both *in vitro* and *in vivo* studies have demonstrated that remineralization of the tooth structure is possible.<sup>68-75,77-81</sup> Remineralization and the prevention of demineralization may also be accomplished through the use of remineralizing gel products provided in tightly adapted vacuform mouth-guard carriers.

## 5. Summary

Saliva is an extremely vital fluid in the maintenance of oral homeostasis and, when reduced, predisposes individuals to oral symptoms and oral disease. The practitioner must be aware of the importance of saliva, be involved in the recognition and diagnosis of problems in salivary function and be aware of available treatments. As is the case in any condition, the general practitioner must be aware of the appropriate time to make a referral. It is within the scope of dentistry that improvements in the recognition, diagnosis and management of xerostomia will develop.

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## FIRST AID TIP



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Frostbite makes the skin white, waxy and numb; freezing causes hardening. • Warm frostbitten area gradually with body heat; **do not rub** • Do not thaw frozen hands and feet unless medical aid is far away and there is no chance of refreezing. They are better thawed in hospital • If there are blisters, apply sterile dressings and bandage lightly to prevent breaking • Get to medical aid.



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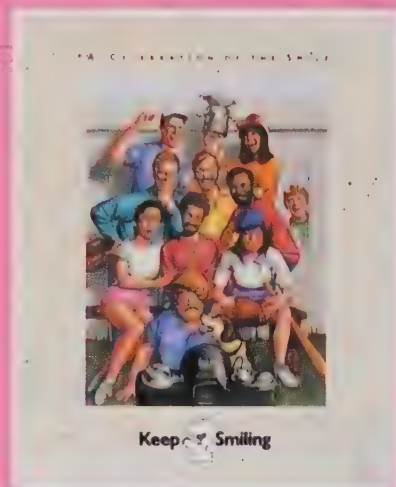
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## The base metal alloy question in removable partial dentures – A review of the literature and a survey of alloys in use in Alberta

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### ABSTRACT

*Base metal alloys have been used for over 60 years to cast removable partial denture frameworks. Among other elements, these alloys principally contain nickel, chromium and cobalt, and may be divided into the nickel-containing and nickel-free alloys. Because of the potential biocompatibility hazard created by these and other elements found in the alloys, this group of materials has come under ever increasing scrutiny in the literature. This paper reviews pertinent literature and reports on the findings of a survey on the base metal alloys used in Alberta for the casting of removable partial denture frameworks.*

### SOMMAIRE

*Depuis plus de 60 ans, on se sert des alliages de vils métaux pour couler l'armature des prothèses partielles amovibles. Ces alliages contiennent entre autres du nickel, du chrome ou du cobalt surtout et on peut les classer suivant qu'ils contiennent du nickel ou non. A cause des dangers possibles de biocompatibilité que ces métaux peuvent causer, on les étudie de plus en plus aujourd'hui. Dans cet article, on passe en revue les publications et les rapports portant sur les résultats d'une étude effectuée sur les alliages de vils métaux qu'on utilise en Alberta pour couler l'armature des prothèses partielles amovibles.*

### Introduction

#### Historical Background to the Dental Use of Base Metal Alloys

Cobalt-chromium alloys, in early versions, were patented in 1907 and were first used in the automobile industry. In 1929, Erdle and Prange<sup>1</sup>

perfected techniques for the use of these alloys in cast dental restorations. Chromium-cobalt-nickel base metal alloys were introduced in the 1930s and since that time have become the materials of choice for the construction of removable partial denture frameworks.<sup>2</sup> In 1943, Paffenbarger and Caul<sup>3</sup> reported that an alloy composed of 70 per cent cobalt and 30 per cent chromium would have optimal physical properties. Since nickel is less expensive than cobalt and has similar properties, it can be substituted for cobalt in the alloy.<sup>1</sup>

#### Uses of Base Metal Alloys in Dentistry

Today, there are two primary uses for base metal alloys in dentistry. For some 60 years, they have been used in casting removable partial denture frameworks. The base metal alloys are as corrosion resistant as gold alloys because of the passivating effect of chromium.<sup>4</sup> In addition, they are lighter than the precious metal alloys, have increased mechanical properties and twice the stiffness, but a similar proportional limit. These features make the base

metal alloys particularly suitable for the construction of removable partial denture frameworks. In more recent times, base metal alloys have been used as metallic substitutes for precious metals in ceramic-metal restorations. Most of these substitute alloys are based on chromium and nickel, with a nickel content of 60-80 per cent.<sup>5</sup> In fact, a 1978 survey of 1,000 dental laboratories revealed that 29 per cent of these laboratories were using nickel-chromium or cobalt-chromium alloys for ceramic-metal restorations.<sup>6</sup> Pierce and Goodkind<sup>1</sup> cite the survey by Aqualino and Taylor<sup>7</sup> of 190 dental laboratories, which found that 72 per cent of dentists were using non-gold containing alloys for fixed prosthodontic restorations. Therefore, it would seem that the use of base metal alloys is on the increase in prosthodontic procedures.

#### Constituents of Base Metal Alloys

Base metal alloys do not usually contain precious metals (gold, platinum, palladium, rhodium, ruthenium, iridium, osmium and silver).<sup>3</sup> The Ameri-

TABLE I:

#### The major constituents of base metal alloys used for casting removable partial denture frameworks (after Phillips<sup>2</sup>)

|              |                                        |
|--------------|----------------------------------------|
| Cobalt -     | carries the chromium in solid solution |
| Chromium -   | conversion resistance/hardening        |
| Molybdenum - | hardener                               |
| Iron -       | hardener                               |
| Copper -     | hardener                               |
| Beryllium -  | hardener (only in Ni-Cr alloys)        |
| Silicon -    | oxide scavenger/hardener               |
| Manganese -  | oxide scavenger/hardener               |
| Nickel -     | replaces cobalt                        |
| Aluminium -  | hardener (only in Ni-Cr alloys)        |



can Dental Association (ADA) specification No. 14 states that a minimum of 85 per cent by combined weight of chromium, cobalt and nickel is required in the base metal alloys used in removable partial denture construction (individual element requirements are not specified).<sup>8</sup> The alloys are divided into two main groups: those that contain nickel and those that are nickel free. A typical nickel-free alloy will contain 60 per cent cobalt by weight and 20-30 per cent chromium. In a nickel-containing alloy, the nickel content may range from less than one per cent to in excess of 80 per cent.<sup>9</sup> Apart from cobalt, chromium and nickel, the alloys may also contain many other elements. Major constituents and their functions are listed in Table I.<sup>2</sup>

From the viewpoint of biological safety, in dentistry, base metal alloys containing chromium, nickel and beryllium have been identified as potential toxins and are said to have allergenic and carcinogenic potential.

## Health Standards for the Use of Base Metal Alloys

According to Basker,<sup>9</sup> various institutions have become increasingly concerned with the adverse effects caused by some of the materials used in the mouth. In 1974, for example, the Swedish National Board of Health and Welfare issued a statement containing a warning against the use of dental casting alloys containing more than one per cent by weight of nickel.<sup>5</sup> The British National Health Service, through its Dental Health Service, has an approved list of 17 cobalt-chromium alloys which have a nickel content ranging from zero to five per cent.<sup>9</sup> The International Standards Organization (ISO) standard ISO/TC 106 for denture base-metal casting alloys specifies that when an alloy contains nickel, the manufacturer must indicate that the alloy should not be used in nickel sensitive individuals.<sup>9</sup> The U.S. Department of Health, Education and Welfare's environmental concentration standard (for work-place air) states that no employee should be exposed to nickel in a concentration greater than 15 per cent  $\mu\text{g}/\text{cm}^3$  of air for up to a 10-hour shift in a 40-hour work week.

From the literature reviewed, it appears that much of the concern regarding the biological hazards of the base metal alloys used in dentistry is directed at nickel. This is reflected in the specificity of the regulatory mechanisms di-

rected at this element, although chromium and beryllium have also caused concern.

## Nickel, Chromium and Beryllium

Nickel is one of the most common allergens and the most potent sensitizer of all metals. It has been described as the "ubiquitous contact allergen."<sup>10</sup> Nickel sensitivity in the general population has been estimated to range from 6.7 to 17.5 per cent.<sup>10</sup> Peltonen<sup>11</sup> found a prevalence of nickel sensitivity of eight per cent in women and 0.8 per cent in men. A further study by Prystowsky et al<sup>12</sup> found similar prevalences of nine per cent in women and 0.9 per cent in men. Magnusson et al,<sup>5</sup> however, cite studies where nickel sensitivity only occurs three to five times more often in women than in men. The number of nickel-containing objects capable of sensitization is significant. It is believed that chronic exposure to the antigen, often through contact with jewelry and stainless steel utensils, is responsible. Covington et al<sup>10</sup> cite the work of several authors who indicate that earrings for pierced ears are the greatest cause of sensitization, since their posts consist of gold-plated nickel alloy.

The mechanism by which nickel may cause allergic phenomena is of interest. The route may be by direct contact of the metal with the skin or mucosa, which can elicit a local or more widespread response. Alternatively, the metal may pass into the blood stream and be transported to the skin in the blood. Dermatological reports have indicated that the ingestion of small amounts of nickel may be a more important factor in causing an allergic response to nickel than external contacts with the metal.<sup>13</sup> It has been shown that the daily intake is 300-600  $\mu\text{g}$  per day.<sup>14</sup> Pierce and Goodkind<sup>1</sup> found, in an *in vitro* study, that nickel-based alloy stored in saliva for one week caused an increase in nickel concentration from  $2 \times 10^{-7}$  to  $2 \times 10^{-4}$   $\mu\text{g}$ . The release of nickel was calculated at approximately 4.2  $\mu\text{g}/\text{cm}^2/\text{day}$ . Covington et al<sup>10</sup> analyzed 14 dental alloys used for ceramic-metal restorations. These alloys had a nickel content varying from 66 to 78 per cent. Saliva was pooled from 300 volunteers, and corrosion rates at varying pH levels and for varying periods in solution were calculated through 120 days. These workers found that dissolution was not time dependant, and that the combination of nickel and beryllium potentiates the dis-

solution of both metals in acidic media. They concluded that there may be a greater health risk from the nickel or beryllium content of these alloys than expected. Espevik<sup>16</sup> showed that the release of nickel ions is accentuated by an increase in the nickel content and a decrease in the chromium content. Once the chromium falls below 20 per cent, the rate of nickel release increases markedly.

While there are some reports of local mucosal lesions developing adjacent to nickel-containing alloys,<sup>17-19</sup> it is remarkable how sparse the reports of this nature are. There are several possible reasons for this. Bergman<sup>20</sup> refers to a number of cases of nickel sensitivity and quotes several reported cases of other authors where the allergy manifested itself as a generalized skin condition rather than as an oral mucosal problem. He reported that the skin complaint resolved when the alloy denture was removed or replaced by one constructed of acrylic resin. Basker<sup>9</sup> refers to the work of Söremark,<sup>21</sup> who commented that when alloys corrode in the mouth, nickel is taken up by other body tissues. The postulated route of uptake involves nickel being transported to the skin via the gastro-intestinal tract by the blood stream. Bergman et al<sup>22</sup> showed that nickel is taken up by the skin, central nervous system, lungs, kidneys and hard tissues of albino mice. In considering this, Basker<sup>9</sup> cites the work of Kaaber et al,<sup>23</sup> who reported aggravation caused by chronic nickel dermatitis in 17 out of 28 patients following oral ingestion of nickel, and an improvement in nine of the 17 following several weeks on a low-nickel diet. It has been recommended that patients who are particularly sensitive to nickel should not be allowed to exceed a concentration intake threshold of 0.06 mg/L.<sup>24</sup>

There are fundamental differences between the skin and oral cavity that may contribute to the lack of mucosal reactions to nickel. Perhaps one important difference is that a salivary glycoprotein film forms rapidly on exposed oral surfaces, and this acts as a diffusion barrier.<sup>1</sup> The literature would seem to indicate that allergic phenomena distant from the site of mucosal contact are more likely.

In order to test the hypothesis that nickel-containing dental alloys may produce local or distant allergic phenomena, several workers have applied various protocols. In dermatology, the sensitivity of materials is generally



shown by epicutaneous patch tests.<sup>25</sup> Blanco-Dalmau<sup>26</sup> proposed the use of a simple patch test using five per cent nickel sulphate to determine if a patient was allergic to nickel. This worker also proposed the use of a dimethylglyoxine test to determine if an alloy contained nickel, and stated that patients should be tested for nickel sensitivity before a nickel alloy is used for a restoration in the oral cavity. Basker<sup>9</sup> reported the use of patch testing on the skin of a patient with reported nickel allergy who required a removable partial denture. The patch tests consisted of one per cent cobalt chloride and one per cent nickel sulphate. These tests revealed the patient to be extremely sensitive to nickel. Buttons of three alloys with nickel contents ranging from 0.74 to 4.25 per cent were applied to the skin, and removable partial dentures containing 0.09 per cent and 0.74 per cent nickel were constructed for the patient. No adverse skin or mucosal reactions occurred to either the test buttons or dentures. This author attributes these results to the low nickel content of the test materials, which provided a low availability of nickel ions in solution. Basker<sup>9</sup> concluded that alloys of 60-80 per cent nickel content by weight would provide a considerably increased potential for adverse tissue reactions. If high nickel content alloys were used, this author stated that a thorough enquiry into the potential for adverse tissue reaction must be made.

Magnusson et al<sup>5</sup> carried out patch testing on 10 patients, all of whom were known to have nickel allergy and five to have cobalt allergy. Five nickel-containing alloys were tested, consisting of one alloy containing seven per cent nickel by weight and four with less than one per cent nickel by weight. All patients showed positive reactions to the seven per cent nickel-containing alloy and only one patient had a positive reaction to the other alloys. These authors cite the work of Nielsen and Klashchka,<sup>27</sup> who found that allergen applications in concentrations from five- to 12-times higher were necessary to elicit microscopic reactions of the oral mucosa than would be required to elicit reactions of the skin. Magnusson et al<sup>5</sup> concluded that they supported the Swedish National Board of Health and Welfare, which has moved against the use of dental casting alloys containing more than one per cent by weight of nickel. Jones et al<sup>28</sup> studied the response of 10 patients to a removable partial denture alloy containing 70 per cent nickel. Of

the 10, five were positive to nickel skin-patch testing and five were negative. Metal inserts of the alloy in a heat-cured acrylic resin base were then placed on either side of each patient's palate. It was found that neither group of patients reacted to the alloy inserts. These authors theorized that the lack of a positive response to the nickel alloy was due to the passivity of the chromium metal alloyed with the nickel, which greatly decreased the availability of free nickel ions. They concluded that a positive history of nickel allergy did not necessarily prevent a patient from wearing a nickel-containing dental prosthesis. This statement, considering the small sample size, must be tempered with the statements of caution issued by the other authors cited in this article. Importantly, however, Jones et al could not find a relationship between a positive skin patch test with five per cent nickel sulphate and a clinical mucosal response to a nickel alloy. Van Loon et al<sup>25</sup> cite Spiechowicz et al,<sup>29</sup> who doubted that a positive skin test implied that there would also be a clinical reaction upon oral exposure to the same material. Indeed, routine patch testing of patients for nickel allergy is not recommended,<sup>30</sup> but, as Basker suggested,<sup>9</sup> when the medical history indicates symptoms such as rashes, causing a dentist to suspect allergy, the patient should be referred to a physician.<sup>1,31</sup> Van Loon et al<sup>25</sup> cite the work of Degreef et al,<sup>31</sup> who state that most reactions caused by delayed hypersensitivity present as subjective symptoms without clinically visible signs. These workers made an *in vivo* comparison between nickel, nickel-containing dental alloys and non-corrosive precious metals using immunohistological examinations of the oral mucosa with monoclonal antibodies directed against T-lymphocytes and Langerhans cells. They concluded that the presence of a high percentage of nickel in a nickel-containing alloy is not necessarily associated with either a clinical or an immunohistological allergic contact stomatitis in nickel allergic patients. The diagnosis of allergic contact stomatitis on the basis of immunophenotyping of inflammatory cells is apparently not always accompanied by visible clinical evidence of allergic stomatitis.

Nickel has been implicated as a carcinogen. Pierce and Goodkind<sup>1</sup> cite Freeman et al,<sup>32</sup> who consider the carcinogenicity of nickel to be dependent upon its solubility and the form in which it presents to the tissue. Pierce and Good-

kind<sup>1</sup> also cite Heuper and Conway,<sup>33</sup> who state that nickel has a latent period of 22 years, with the target organ being the lung. Flessel, Furst and Radding,<sup>34</sup> in a review of carcinogenic metals, constructed an index to rate metals according to suspected carcinogenicity in humans. This index placed nickel-chromium compounds as being the most potentially dangerous. Cancer of the respiratory tract has long been associated with chromium, and many experimental studies have been performed on the carcinogenicity of this element.<sup>1</sup>

The information in the dental literature on the allergenicity of chromium in relation to oral tissues is sparse. The majority of studies have, as discussed above, examined the nickel-chromium alloys. Sensitivity to chromium results from contact with chromate salts, which develop as a result of alloy corrosion.<sup>30</sup> Allergic phenomena in the mouth related to contact intraorally with chromium are regarded as being rare.<sup>30</sup>

The toxicity of beryllium has been a well known and established fact since the 1940s.<sup>1</sup> Pierce and Goodkind<sup>1</sup> refer to Tepper et al<sup>35</sup> who state that beryllium affects the skin, eyes, lungs and nasal passages in either acute or chronic form. Acute problems produce acute dermatitis, conjunctivitis and bronchitis. The respiratory effects in the acute form range from inflammation of the nasal mucosa and pharynx and tracheobronchial involvement to a severe chemical pneumonitis. Chronic disease may not express itself for a number of years, but will manifest as biochemical abnormalities in the liver and changes to serum protein, uric acid and urinary calcium levels. While Covington et al<sup>10</sup> showed beryllium leakage from base metal alloys in human saliva, the greatest problems arise with beryllium vapor released in the dental laboratory during casting procedures.<sup>1</sup> Beryllium is used in the nickel-containing alloys as a hardener, grain structure refiner and to reduce the fusion temperature. Moffa et al<sup>36</sup> found elevated levels of beryllium in the atmosphere when finishing beryllium-containing non-precious alloys without the use of an extraction system. Covington et al<sup>10</sup> provide a concise report on the chemistry and bioactivity of beryllium. They estimate that every beryllium compound cited in the literature appears to have some hazard associated with it. These workers also conclude that nickel and beryllium react synergistically. It is not surprising, therefore, that it has been concluded that the nickel-beryllium casting alloys have the



**TABLE II:****Identified brand name base metal alloys in use in Alberta for casting removable partial dentures**

|    |             |                                                             |
|----|-------------|-------------------------------------------------------------|
| 1. | Vitallium - | Nobelpharma, Ontario, Canada                                |
| 2. | Nobilium -  | Nobilium Canada Inc., Toronto, Ontario                      |
| 3. | Super-6 -   | Dental Alloy Products Inc., Compton, California, U.S.A      |
| 4. | Remanium -  | Dentaurum, Pforzheim, Germany                               |
| 5. | Biosil F -  | Degussa, Burlington, Ontario, Canada                        |
| 6. | Ticonium -  | Ticonium Division, CMP Industries, Albany, New York, U.S.A. |

potential to be of significant hazard to technicians, dentists and patients.

### Summary of Review of Literature

There are obviously a good many issues related to the use of base metal alloys in the oral cavity that require answering at both a basic science and clinical investigation level. Currently, there seem to be two opposing attitudes to the use of base metal alloys, primarily with regards to the use of the nickel-beryllium containing alloys. One side counsels extreme caution, since there is a lack of definitive information on the use of base metal alloys containing these elements. The opposing view is that, in the absence of definitive information, and since there appears to be little evidence of their having an effect on the oral tissues, clinicians may continue to use high nickel-content alloys. The scientific evidence now available does little to resolve these differing positions on the use of base metal alloys in removable partial dentures.

### Determination of the Constituents of Base Metal Alloys Used for Removable Partial Denture Construction in Alberta

#### Methods and Materials

Through the then Dental Technicians Board of Alberta and the Yellow Pages, a questionnaire was sent to every identifiable commercial dental laboratory in Alberta. The questionnaire requested the following information:

1. Were removable partial denture frameworks cast by the laboratory?
2. If frameworks were not cast, was this

work being sent out to other laboratories? (This question was used for cross-referencing to locate any laboratories not yet identified as providing a removable partial denture casting service.)

3. If frameworks were being cast:

- a) laboratories were asked to indicate if brand name or "no name" alloys were being used;

- b) if "no name" alloys were in use, laboratories were asked to explain the reason for this decision.

- c) laboratories were asked to identify the alloy(s) in use and the source of supply.

In a follow-up response to the laboratories that cast removable partial dentures, a request was made for five casting buttons to be supplied. The casting buttons were submitted to a materials engineering company (Hanson Materials Engineering, Edmonton, Alberta) for chemical analysis. Chemical analysis was performed with a direct reading spectrometer (Atomcomp 81, Thermo Jarrell-Ash, Boston, Mass., U.S.A.) using a spark source. All samples were ground smooth to a finish of 80 grit before analysis. Using traceable high cobalt alloy and/or high nickel alloy standards, a calibration line was developed using a PS2 computer (IBM, Armonk, New York, N.Y.) by plotting intensity versus concentration. All samples were analyzed using the developed calibration lines to obtain the per cent by weight of each element (carbon, manganese, silicon, nickel, chromium, molybdenum, tungsten, iron, cobalt). At regular intervals, a standard was treated as an unknown sample and analyzed to check the calibration line. In the correspondence to laboratories, the purpose of the study in relation to nickel content was not indicated, and confidentiality of all responses was ensured.

**TABLE III:****Number of laboratories in Alberta identified as using brand name removable partial denture base metal alloys**

|          | No. of laboratories using the alloy |
|----------|-------------------------------------|
| Vitalium | 6                                   |
| Nobilium | 7                                   |
| Super-6  | 3                                   |
| Ticonium | 2                                   |
| Remanium | 1                                   |
| Biosil F | 1                                   |

### Results and Discussion

Apart from the Removable Prosthodontic Laboratory of the University of Alberta, 16 commercial laboratories that cast removable partial dentures were identified in Alberta. The Canadian Forces in Alberta and the Northern Alberta Institute of Technology (NAIT) also have facilities for casting removable partial denture frameworks. The present study was part of a wider study to identify a population of removable partial denture wearers in Alberta. As part of defining the required population, the Canadian Forces were excluded. NAIT does not provide removable partial denture castings to the public, and so were also excluded from the present study. Both the Canadian Forces and NAIT are reported to use high nickel-content alloys.

It was found that all of the responding laboratories used brand name alloys. One laboratory made use of a 'private label' alloy. This alloy was identified by the laboratory concerned as a cobalt-chromium for implant application. Two laboratories made use of more than one brand name alloy. All other laboratories used only one alloy. Only one laboratory stated that there had been any recent change in alloy selection. The alloys found to be used are provided in Table II. Specific subgroups of brand names were not identified. The number of laboratories using each alloy is shown in Table III. After the survey was completed, another commercial laboratory established facilities to produce high nickel-content framework castings.



TABLE IV:

# The nickel, chromium and cobalt content of the alloys tested (weight per cent)

| Laboratory | Nickel | Chromium | Cobalt | No. of Buttons submitted | Identification of alloy by laboratory |
|------------|--------|----------|--------|--------------------------|---------------------------------------|
| 1          | 0.01   | 35.50    | 57.40  | 5                        | Vitallium                             |
| 2          | 0.0    | 34.44    | 58.00  | 5                        | Vitallium                             |
| 3          | 0.01   | 32.18    | 60.20  | 5                        | Vitallium                             |
| 4          | 0.02   | 30.20    | 61.80  | 5                        | Nobilium                              |
| 5          | 0.37   | 30.46    | 61.00  | 5                        | Nobilium                              |
| 6          | 0.11   | 30.55    | 62.00  | 4                        | Nobilium                              |
| 7          | 74.00  | 14.74    | -      | 5                        | Ticonium                              |
| 8          | 0.63   | 29.64    | 61.20  | 5                        | Vitallium                             |
| 9          | 0.12   | 30.30    | 62.60  | 5                        | Nobilium                              |
| 10         | 0.24   | 28.03    | 64.33  | 3                        | Nobilium                              |
| 11         | 0.02   | 27.74    | 64.60  | 5                        | Vitallium                             |
| 12         | 0.01   | 32.90    | 59.25  | 4                        | Vitallium                             |
| 13         | 0.01   | 27.58    | 65.20  | 5                        | Biosil                                |
| 14         | 0.12   | 28.40    | 64.50  | 2                        | Nobilium                              |
| 15         | 0.01   | 29.40    | 61.50  | 2                        | Super-6                               |
| U of A     | 75.00  | 14.04    | -      | 5                        | Ticonium                              |

In most cases, the rationale behind the selection of the base metal alloys in use for removable partial denture casting appeared to be related to product support. Of the 16 commercial laboratories identified, 15 submitted casting buttons for analysis. Laboratories using multiple alloys submitted only one batch of buttons. The average percentage by weight for nickel, chromium and cobalt contents is provided in Table IV. The laboratory not supplying casting buttons identified the alloy used as a silver-palladium, non-nickel containing alloy.

From the above results, it appears that the great majority of the responding commercial dental laboratories make use of very low and non-nickel containing base metal alloy for casting removable partial denture frameworks. Except for the castings being provided by the two commercial laboratories using high nickel-content alloys, the remaining alloys in use are low or non-nickel content base metal alloys, as discussed by Basker.<sup>9</sup> While it was not possible to analyze the specimens for beryllium content, it is known that the high nickel

content alloys will usually contain approximately 1.0 to 1.5 per cent beryllium by weight. The use of nickel-beryllium containing alloys used in fixed prosthodontics is not considered in the present report.

## Conclusion

Base metal alloys have been in use in dentistry for over 60 years. This paper reviews their status in relation to their biocompatibility when used for removable partial denture castings. The literature indicates that there are concerns regarding the use of base metal alloys for partial denture casting and, in particular, the alloys containing nickel appear to come under the closest scrutiny. The survey on base metal alloy use in casting removable partial dentures in Alberta found that 15 out of 17 laboratories surveyed used non- or low nickel-containing alloys. More research into the possible deleterious effects of the base metal alloys is required. Until a better understanding of the biocompatibility of these alloys emerges, the literature indicates that it would be wise for the clinician to evaluate a patient's his-

tory for potential allergies to the prime constituents of these alloys. If a positive history emerges, the patient should be referred to a dermatologist to establish positive allergic responses. The clinician should then select the base metal alloy accordingly.

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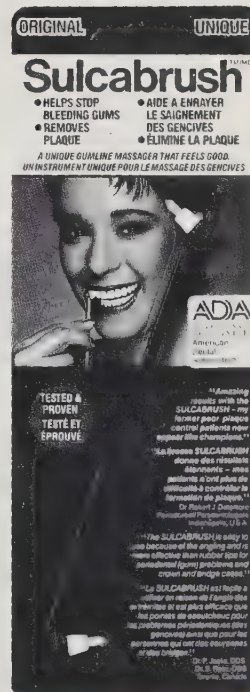
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## Hemimaxillary odontogenic dysplasia: Case report

S.A. Moss, B.Sc., DDS  
Toronto

### Introduction

Odontogenic dysplasia has been commonly referred to as regional odontodysplasia, odontogenesis imperfecta or, more graphically, as "ghost" or "shell" teeth.<sup>1,2</sup> This unusual developmental condition affects both the dentin and enamel formation, resulting in hypoplastic and hypocalcified teeth. The condition is further characterized by short roots, open apices, large pulp chambers, discoloration and under eruption.<sup>1-3</sup> The radiographic appearance of the condition as ghost or shell teeth is virtually pathognomonic. The shell appearance is due to the large pulp chambers and very thin enamel and dentin layer. This anomaly has also been associated with vascular nevi overlying the adjacent skin of the face.<sup>2</sup> Most often, odontogenic dysplasia involves one or two teeth and is localized to one quadrant.<sup>2</sup> A higher incidence of the condition has been reported in females.<sup>2</sup> It is usually diagnosed in the primary dentition stage of dental development.<sup>1,2</sup>

### Case report

A four-year-old black male presented to the dental clinic for his first-ever visit. His parents were concerned about the under eruption and discoloration of all his teeth in the maxillary right quadrant. They were also disturbed by the fact that the child never used the right side of his mouth for chewing. The parents had first noticed the discoloration two years previously (at age two years), but neglected to bring the child in for examination. There was no history of childhood disease or trauma; however, the child was born two months prematurely. Upon examination of the parents' dentitions, no evidence of the anomaly was apparent.

Intraoral examination revealed that all of the child's right maxillary teeth were orange-brown in color and highly mobile (51-M3, 52-M2, 53-M1, 54-M1, 55-M2). All of the affected teeth ap-

peared to be submerged relative to the contralateral teeth. The buccal sulcus contained two actively draining abscesses, one opposite 51 and the other opposite 55. The parents did not recall any vascular nevi overlying the adjacent skin of the child's face at birth and none was present at the time of examination. The patient was not in any discomfort upon presentation.

The upper right periapical view (Fig. 1) displays ghost teeth 54 and 55. The alveolar bone surrounding 55 is severely resorbed, as expected from its M2 mobility and the presence of rarefying osteitis. There does not appear to be a 15 follicle developing below 55. Either the follicle had not yet developed or it was destroyed by the abscess formation. The 14 follicle is very radiolucent when compared to 24 (see Panelipse - Fig. 2). As with 14, the 16 follicle is very radiolucent when compared to its contralateral tooth 26. The 17 follicle is evident.

The anterior periapical film (Fig. 3) shows a similar pattern in the developing follicle of 11 as it exhibits a very under-developed, radiolucent follicle compared to 21. The affected teeth ap-

pear to have a very thin enamel and dentin layer. They also exhibit large pulp chambers and wide open apices. Due to the draining abscesses, the high mobility and overall poor quality of the crowns, a decision was made to extract all five affected teeth under local anesthesia. Extraction was complicated due to the eggshell-like brittleness of these teeth – they all fragmented during forceps extraction. The extraction sites were curetted carefully and gut sutures were placed. One week later, the extraction sites were found to be healing uneventfully.

Future treatment will involve placing a denture for functional as well as esthetic reasons. After consultation, however, the parents refused further treatment for their child until his adult teeth begin to erupt. A possible complication from the delay in treatment may be the super eruption of the opposing primary teeth, which could lead to the super eruption of the fourth quadrant adult teeth. During normal growth, the maxilla will become too large for the denture and new prostheses will be required. Since the adult teeth in the maxillary right quadrant also appear to be af-

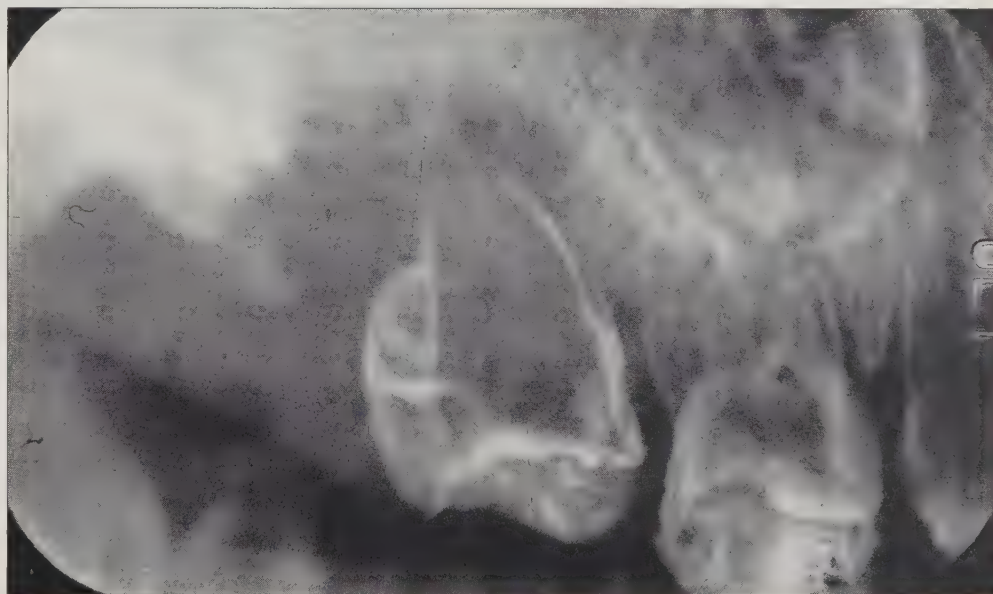


Fig. 1. Upper right periapical view displaying "ghost" teeth 54 and 55.



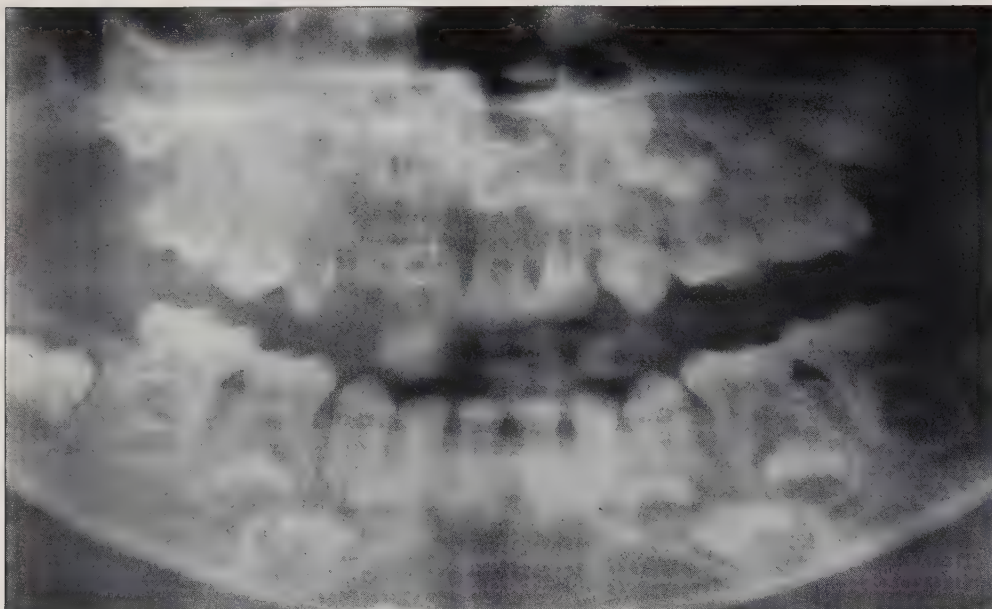


Fig. 2. Panelipse.

ected, they too may require extraction at some point in the future. This is because such teeth tend to abscess easily as a result of their thin enamel, dentin layer, and their wide open apices.

## Discussion

Many causes of odontogenic dysplasia have been suggested in the literature; however, no conclusive etiological factor has been proved. The suggested causes include: trauma,<sup>4,5</sup> infection,<sup>2</sup> irradiation,<sup>4,5</sup> metabolic disturbances,<sup>4</sup> somatic mutation,<sup>4</sup> nutritional deficiency,<sup>4</sup> hyperpyrexia,<sup>5</sup> local circulatory disorders,<sup>2</sup> local ischemia,<sup>5</sup> and most recently, a genetic cause with a familial pattern has been reported.<sup>3</sup> This particular case does not appear to fall into any of the above categories; however, a complete medical examination was not performed. Detailed questioning of the parents turned up nothing unusual except for the child's premature birth. The etiology of the condition could possibly be linked to the premature birth.

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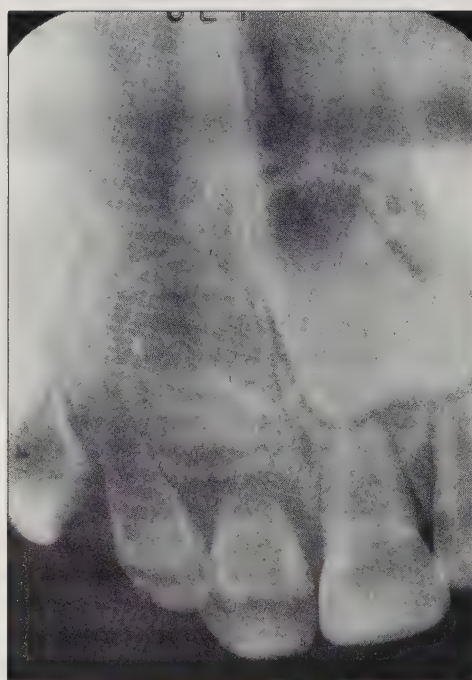


Fig. 3. Anterior periapical view.

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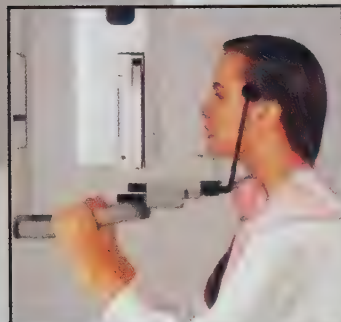
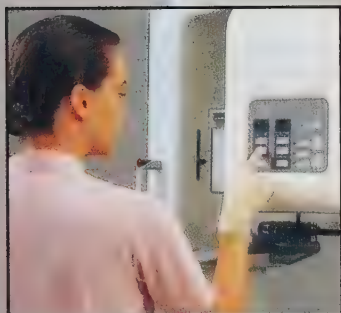
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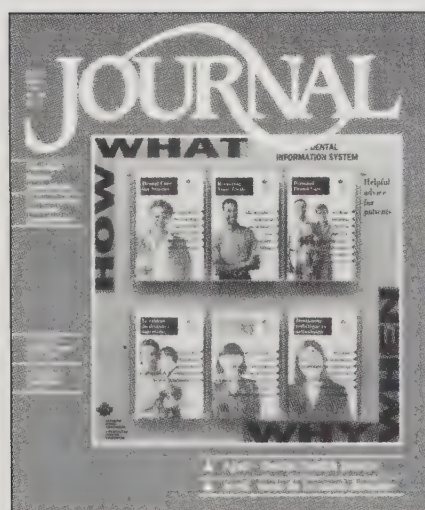
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## INFORM BEFORE YOU PERFORM

A few months ago, a dentist friend had his gall bladder removed. Normally, a cholecystectomy isn't a big event. Over half a million are performed each year, making it North America's most common surgical procedure.

However, this dentist's case was somewhat unusual. First of all, he had put up with pain and discomfort for almost 10 years, saying, "I can't afford the time."

In truth, he was scared. Now middle aged, he had never been ill, never undergone a surgical procedure and never been given a general anesthetic. He was afraid of the unknown. Besides, he *really* didn't want to give up the time – almost a week in hospital and another six weeks of limited activity during the recovery stage.

Then the dentist heard about a new laproscopic technique. Instead of making a typical 15-centimetre incision to reach the gallbladder, surgeons can now make four one-centimetre incisions, through which they insert a camera and their instruments. And instead of involving weeks of convalescence, the new technique is almost an outpatient procedure.

This scenario sounded much better to our friend, and he made an appointment with a laproscopic surgeon practising in a local teaching hospital. It was the beginning of a series of very satisfactory interactions between the patient and medical staff – events that could prove beneficial to many dentists, not only for their gallbladder ailments, but also for improving their practice management techniques.

For starters, the consultation occurred on time – there was no long wait in the hospital's busy reception area. And after a registered nurse had recorded his history and read his blood pressure, his surgeon took the time to listen to the dentist's concerns and then *fully* explained how laproscopic surgery worked. A series of convenient appointments were made for laboratory, ultrasound and radiology tests, and again there was no waiting – each test occurred on time.

On a Thursday evening, some six weeks later, he was admitted to hospital, with the surgery scheduled for the next morning. The preop preparations were truly impressive. There was a virtual parade to the dentist's bedside. A nurse, the anesthetist, a resident, and even a fourth-year medical student, who dropped by to explain in detail what was going to happen in the morning. It was all very reassuring.

The hour-and-a-half operation went off without



Dr. Ralph Crawford

a hitch. Our dentist friend was kept in the hospital overnight and released the following morning, Saturday, just 24 hours after undergoing surgery. That evening, he went for a short walk; Sunday he and his wife went to the market and on Monday morning he was back in his office.

For the first few days he left work early, but within a week he was back in stride. The dentist was so impressed with the way everything had gone that he wrote to the surgeon and the hospital

administrator, extolling both the staff and their methods.

At no time was he treated with anything except understanding, compassion and respect. What particularly impressed our friend was that no one knew he was a dentist – he hadn't received preferential treatment because he was a fellow health-care worker. The hospital staff addressed him as "mister," and he didn't bother to correct them. He'd enjoyed the anonymity.

And so our friend relearned a lesson that most dentists have always known – but sometimes fail to practise. In life, especially in health-care settings, communication is paramount. Dental registrars and mediation committees have told us for years that the old adage, "inform before you perform," properly balanced with large doses of empathy, can eliminate most of the complaints and misunderstandings that occur in our dental offices.

Featured on the cover of the *Journal* this month are some of the new dental information pamphlets developed by CDA in cooperation with Colgate-Palmolive. Eventually, there will be a series of 16 pamphlets covering every dental discipline. These booklets, and all the other CDA dental information materials, are specially designed to inform your patients on all aspects of dentistry.

April is National Dental Health Month. It is an ideal time to review dental education protocol and patient information materials. Why not have the entire office staff meet and discuss dental practice management techniques and how they affect patient comfort levels? Surely, if the "inform before you perform" routine helped our friend through a gallbladder operation, it can work wonders in your dental office.

P. Ralph Crawford, BA, DMD

Editor, *Journal of the Canadian Dental Association*



“CDA is the voice of my profession. I just can’t imagine not being a member.”

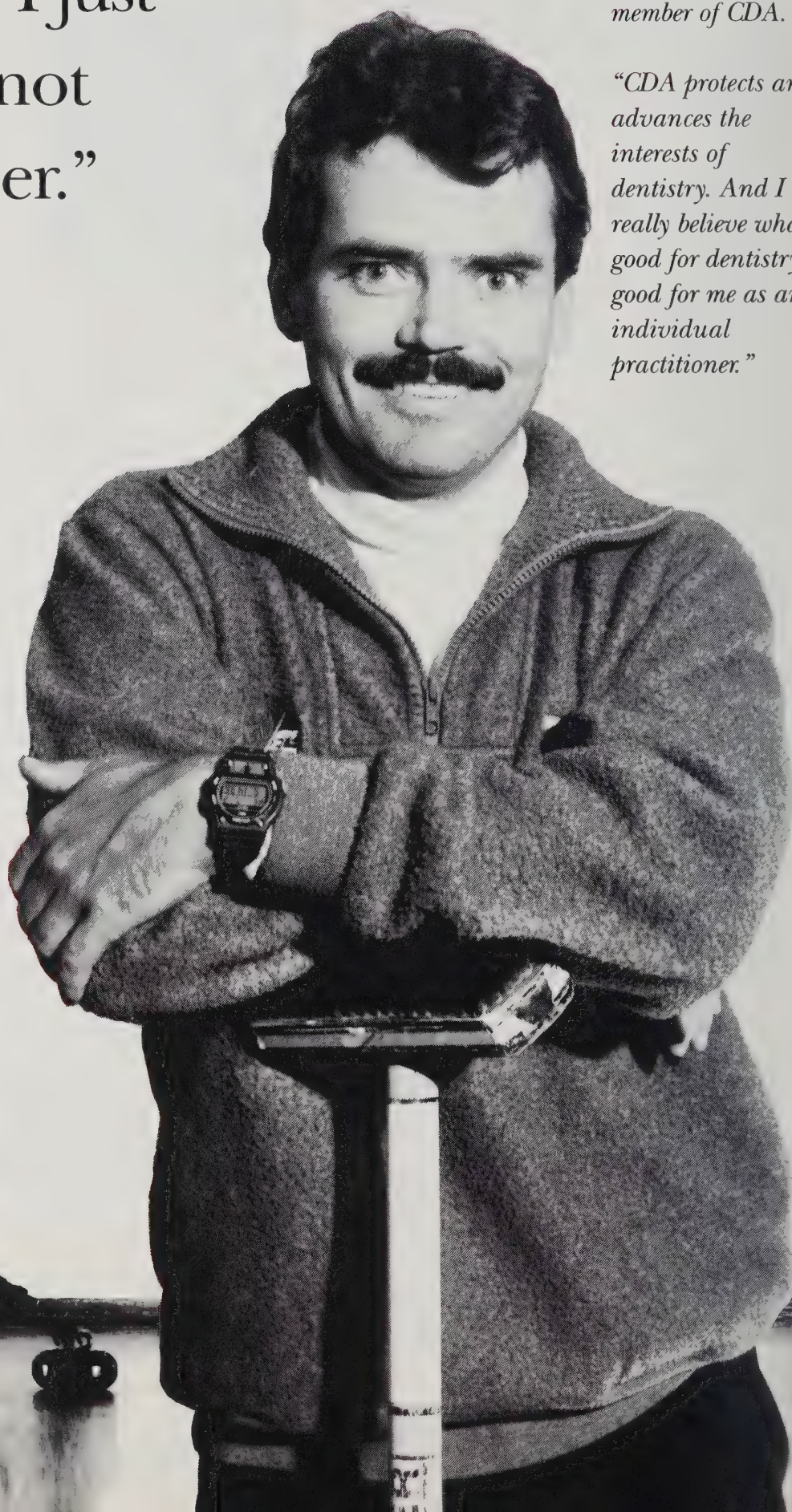
*Dr. Kardy Solmundson,  
Winnipeg, Manitoba*

*Dr. Kardy Solmundson:  
general practitioner,  
curler – and  
member of CDA.*

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advances the  
interests of  
dentistry. And I  
really believe what’s  
good for dentistry is  
good for me as an  
individual  
practitioner.”*



*The Canadian Dental Association is the national voice of dentistry – informing, educating, advising, advocating. It’s one of the ways CDA works for you, and for dentists all across Canada.*





# President's Column

## FISCAL RESPONSIBILITY

These days, the two words that come to mind during every debate over government spending, the hard times facing many associations and charities, or even the household budget, are fiscal responsibility.

The public's current obsession with the concept of fiscal responsibility isn't all that surprising. Both Canada and the United States are in the grip of a major recession, millions of people are out of work, and the economic forecast continues to be grim.

What is surprising, however, is that it's taken people so long to learn what successful organizations, like CDA, have known for years. Fiscal responsibility can't be turned on and off, it has to be a continuous process, year in and year out, in both good times and bad.

Each and every dollar that CDA spends is carefully reviewed, monitored and evaluated. Each program is scrutinized to ensure that it is within budget, and additional spending, should it be necessary, requires the full approval of the executive council.

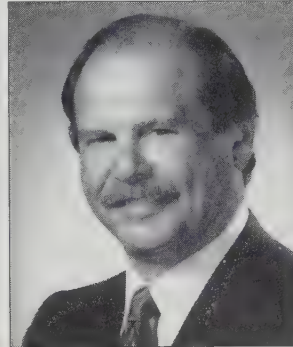
Let's go through CDA's budgetary process from start to finish. At each fall planning session, CDA's executive and senior staff review a number of financial matters. First, we compare our actual financial position to the budget estimates for the first nine months of our fiscal year. This gives us a pretty fair idea of where we stand financially with one quarter of the year remaining. (We actually make a similar review on a monthly basis.)

Second, we fine tune the budget for the following year, just three months away. As part of this process, the various department heads outline any important adjustments that have to be made. The budget is then modified accordingly (if necessary) and approved by the executive for implementation January 1.

Third, and this is the basic reason for holding our planning session, we set priorities for upcoming years. This provides direction to the staff, who can then establish appropriate budget figures for the fiscal year beginning 15 months down the road.

At the executive council meeting at the end of January, we review the previous year's financial figures and begin the process of adjusting the following year's budget, now just 11 months from being implemented. We also prepare the necessary information to take that budget, along with the motions required to create a membership fee, to the midterm board.

Over the years, this process has worked extremely well. Unforeseen events have thrown us a few curves from time to time, resulting in year-end deficits such as those CDA experienced in 1990 and 1991, but deficits occur in every organization. In CDA's case they are a sign of vitality and growth – an investment in the future.



Dr. Les Allen

We are developing, today, the new projects and initiatives that will carry organized dentistry into the 21st century and beyond.

This is not a haphazard process. Each year, we examine all the programs and services that make the Canadian Dental Association so vital. We initiate new programs, we give others increased priority, and question which ones should be cut-back or ended.

As a fiscally responsible organization, we cannot shy away from reducing the scope of our less effective programs, or even from eliminating them all together. Programs cannot go on forever, regardless of how important they may have been in the past. At the same time, we are somewhat limited in our ability to implement major changes because of our fixed expenses on items such as administration, the building, the *Journal*, the library, and committee, council, and board meetings, etc.

On the revenue side, each year we are faced with the same situation and the same questions. How are we going to do in Ontario and Quebec? How much should we spend on a membership campaign in these two "voluntary" provinces? How conservative do we have to be in our budgeting?

And we are conservative. Our non-dues revenue accounts for about 30 per cent of our total revenues. This figure isn't high enough. It means that we continue to rely heavily on membership dollars, and that we will continue, each year, to struggle with the questions I've outlined above.

Therefore, we will work harder at increasing our non-dues revenue in the future. We believe that new merchandise – our Dental Information System, expanded library services, and CDAnet, for example – is the key to achieving this goal. Still, CDA is a membership-based organization, and it is unlikely that the funds generated by these programs should, or will, ever account for more than 50 per cent of total revenues.

We are all striving, despite the tough economic times, to ensure that CDA operates on a balanced budget in 1992 and in years to come, as promised at the 1991 annual meeting. This will require a concentrated, month to month effort, but we won't shrink from the task. Throughout the year, we will work hard to achieve the best possible results for all of our members – while maintaining our fiscal responsibility.

Les Allen, B. Comm., DMD  
President of the Canadian Dental Association



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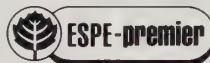
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# A Year of Celebration

## 1902 – The Canadian Dental Association

Ninety years ago, in March 1902, a letter to the editor that would be the seed from which the Canadian Dental Association was born appeared in the *Dominion Dental Journal*.

It was written by Dr. Eudore Dubeau, the secretary of the Quebec Dental Association, to encourage dentists from across Canada to attend a meeting in Montreal on September 16, 1902. The concept of having a national dental organization in Canada was dear to Dr. Dubeau's heart, and had been for a long time. Fortunately, his "call to arms" was prophetic.

"Every dentist in Canada who can rise above mere local or provincial affairs in our country, and has thought about the immense advantage to be gained by the nationalization of the dental profession, should unhesitatingly give the ideal his support," wrote Dr. Dubeau.

"Surely no dentist having a spark of national Canadian character in him will fail to appreciate what such an association will mean to the profession and to him? Think about it, talk about it, be present at it, and take part in it."

In his *History of Dentistry in Canada*, Gullet called the attendance at the 1902 Montreal meeting remarkable. "Some 344 dentists were present, 19 per cent of the dentists in Canada at the time," he wrote. "All provinces and the Northwest Territories were represented. From the business sessions resulted two new national dental organizations – the Canadian Dental Association and the Dominion Dental Council, both created with great unanimity."

Dubeau's dream was fulfilled. Today, CDA is the national authoritative voice for organized dentistry in Canada – a strong and vital organization. The Dominion Dental Council's path would be somewhat more difficult, however...

## NDEB Celebrates 40 Years

Founded at the historic 1902 meeting in Montreal, the Dominion Dental Council (DDC) was formed to conduct written examinations leading to a national dental certificate. The first DDC exams were held in 1906. Four of the seven candidates who wrote them were successful.

But DDC was soon to face tough times. While some provincial licensing authorities were prepared to grant a licence to practise to individuals holding a DDC certificate, others refused to do so. These bodies deemed the certificate to be nothing more

than proof of academic achievement, and required candidates to pass provincial practical tests.

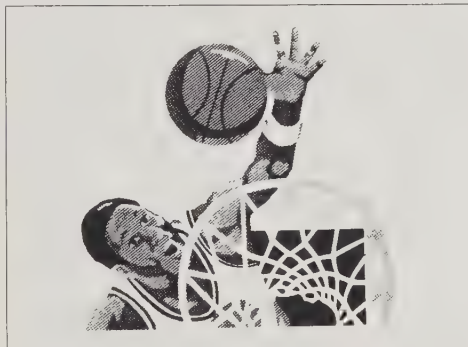
DDC became the Dental Council of Canada in 1950, but the name change, combined with some attempts to improve the efficiency of the examination mechanism, failed to attract strong support from the provincial licensing authorities.

CDA took the initiative in 1951, calling on the 10 provincial licensing authorities to meet for the purpose of developing a satisfactory plan for a national examining board. The body envisaged by CDA would provide a facility by which members of the profession could become eligible, on a national basis, to apply for practice privileges in the province of their choice.

This meeting resulted in the incorporation of the National Dental Examining Board of Canada (NDEB) by a 1952 act of Parliament. The act was supported by all 10 provincial licensing authorities and CDA. By 1991 more than 12,500 dentists had qualified for the NDEB certificate.

The first official meeting of the NDEB was held at CDA's headquarters in Toronto on June 29-30, 1953. The first NDEB members of the board were: Drs. A.G. Racey, Que.; R.J. Godfrey, Ont.; W. Miller, B.C.; H. Easton, N.S.; J.F. Edgecombe, N.B.; R. Ball, Nfld.; H.J. Merkley, Man.; W.F. Hancock, Sask.; H. McIntyre, P.E.I.; H.R. MacLean, Alta.; R.G. Ellis, Ont.; and J.A. Fortier, Que.

## Basketball – 100 Years Old



In January, 100 years ago, Dr. James A. Naismith, a Canadian, invented the game of basketball.

Born in Almonte, Ontario, in 1861, Dr. Naismith's childhood days were hard. Orphaned when he was just eight years old, he dropped out of school at an early age. But he returned to Almonte High School at 20, going on from there to McGill University in Montreal.

Some years later, as a physical education instructor at the YMCA's International Training School at Springfield, Mass. (now

Springfield College), Dr. Naismith was asked to devise an indoor game. He first tried a variation of soccer, lacrosse and football, then opted for elevated goals.

Dr. Naismith asked the building supervisor for two boxes about 18 inches square, but only peach baskets were available. The baskets were attached to the balconies at each end of the gymnasium, the rules of the new game were drawn up and explained to the players, and the first-ever game of basketball was played. At the outset, someone had to perch on a ladder to scoop the ball out of the baskets after each goal. Later, holes were opened at the bottom of the baskets, and a pole was used to pry the ball loose. In 1893 bottomless cord nets became standard. Regulation-size balls became standard in 1894, backboards in 1895 and dribbling was added to the rules in 1900.

Dr. Naismith went on to attend Gross Medical School in Colorado, receiving his medical degree at the age of 37. He was on the medical staff at the University of Kansas for 40 years and published several books on sports medicine.

At 64, Dr. Naismith became an American citizen. He died in Lawrenceville, Kansas, in November 1939.

## Prince Edward Island

Prince Edward Island's first Dental Act was proclaimed in 1891. Contrary to the dental acts of Nova Scotia and New Brunswick, the P.E.I. act did not mention an association or a dental society as a governing body. (There were only seven dentists on the island 100 years ago.)

Credit for securing the Dental Act is attributed to Dr. John S. Bagnall, the first native Prince Edward Islander with a dental degree to practise there. He was the father of Dr. J. Stanley Bagnall, who became the first full-time dean of Dalhousie University's faculty of dentistry.

Prior to the act's passage, an interesting and enterprising advertisement for the dental services of a Dr. Clement appeared in an 1878 issue of the *Charlottetown Examiner*... *Begs to inform the citizens of Charlottetown and vicinity that he has adopted the following scale of charges to suit the times and to put dentistry within the reach of all:*

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*For amalgam and all composition fillings \$0.50*

*All work guaranteed first class...*

*(Thanks to Dr. Oscar Sykora, Halifax)*



# Practice Management & Success

## Designing Better Dentistry: The Ergonomic Approach

There's no getting away from the fact that dentistry, notwithstanding all its rewards, can be a stressful profession. What's puzzling is that many dentists are often unwilling to take advantage of the opportunities that exist to reduce stress. Consciously or subconsciously, they resign themselves to the "fact" that dentistry and high stress go hand in hand.

But the link between dentistry and stress can be broken. By identifying where stress is coming from, you can tackle it head on. The most important factor in the equation is probably the dental office. It should be comfortable, efficient, functional and esthetic for you, your team, and your patients. In other words, its design should be based on ergonomic principles.

Ergonomics (also known as human engineering or biotechnology) is the science of arranging and designing the things people use in a manner that will maximize the effective interaction between the things and the people. It is an approach to design that holds human characteristics – anatomical, physiological or psychological – as critical factors in the design process. An ergonomic dental office, then, is designed around the people who use it rather than the equipment it houses.

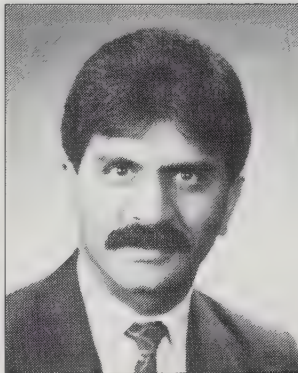
Now consider the design of your office. Is it planned around your needs, as well as those of your team and your patients. Is it comfortable, efficient, attractive and functional?

If not, you should probably consider changing the design of your office or even moving to a new location. Beware of falling into the "I can't afford to improve, expand or move" trap. If you're operating in a deficient environment, you can't afford not to initiate a change.

### Meeting Environmental Stress Head On

If you've concluded that your office environment is stressful, and you're willing to do something about it, you're well on your way to eliminating stress from your practice.

First, talk to your staff (and your



*Imtiaz Manji  
B.Sc.  
President of  
ExperDent  
Consultants  
Inc.*

patients) about what's wrong with your office design, and solicit "wish lists" on how they would like it to be changed. Emphasize that you want them to consider each and every aspect of their physical surroundings, from the chairs they sit in (anatomical) to the temperature of the office (physiological) to the degree of privacy (psychological). Remember, you need to look beyond your immediate needs to your long-term goals.

By closely examining the levels of comfort and efficiency (or the lack thereof) in your office, you'll be able to pinpoint the daily irritants that interfere with work flow and produce stress. The list of deficiencies is likely to be diverse, from complaints about inaccessible files (from the secretary), to frustration over having to negotiate an obstacle course of wires to get into the operatory (from the dental assistant).

Most of us are so preoccupied with actually doing our daily work that we rarely take the time to reflect on how well we are functioning within our physical surroundings. We're too busy "doing" to think about whether we could be performing with greater ease, less frustration and, ultimately, less stress. We end up tolerating and accepting less than ideal conditions, and that makes our jobs harder than they really have to be or should be.

But once you put on your ergonomist's "hat," you'll see things in a new way. Irritants that weren't obvious before will stand out, begging to be corrected. For example, you may have suffered tremendous eye fatigue due to the inconsistent illumination levels be-

tween task and ambient lighting in the operatory. Or perhaps your office has poor sound insulation, allowing "delicate" conversations in the business office to be overheard.

Although these kinds of subtle imperfections are unlikely to result in widespread dissension, they can have a negative affect on your staff's performance – to say nothing of their health, overall morale and growth potential.

### Planning the Ergonomic Office

Making the leap from a deficient to an efficient office design isn't something you want to tackle on your own. It requires the assistance of an architect familiar with ergonomic principles, one who understands the dental team's diverse needs.

The architect will certainly benefit from the "wish lists" described above, but they won't come close to giving him (or her) all the necessary information. Therefore, he may ask you to identify other dental offices whose design you admire. And he will most definitely need to visit your practice to see how it is (or isn't) working. Only by seeing firsthand how and where each team member performs their tasks can he make valid recommendations on how to make the practice run more smoothly.

To complete his evaluation, the architect will consider every aspect of your office environment: public and private areas, decor colors, lighting, decoration, furniture, placement of equipment, acoustics, heating, ventilation, and air conditioning, for example. And he'll determine the affect – be it anatomical, physiological or psychological – these physical surroundings have on you, your staff and your patients.

Therefore, the first thing you and the architect need to do is discuss your practice philosophy and your specific needs, both long and short term. The type of practice you operate may require special facilities for labs or equipment, and these needs must be incorporated into the final office design.

You also have to consider the size of



your practice. If you plan to expand in the future, you must plan for this growth at the outset so that it isn't hampered by inadequate space later on. Finally, a good architect will return to your office, once the new design is in place, to see if it is being used properly and effectively. In some cases, minor adjustments in the design may be needed before it fully meets the needs and wants of you and your team.

## The Untold Benefits of Ergonomically Designed Dental Offices

Your dental team will greet your efforts to improve their working conditions with renewed confidence and a positive attitude. They will be motivated by the concern you've displayed for their well-being and this, in turn, will make them happier, more productive workers. Most important, the office will work better, freeing you to concentrate on your main objective: delivering quality dentistry.

But the benefits of an ergonomically designed office are not confined to you and your team. Your new and improved look will also have a tremendous impact on your patients. An esthetic, comfortable office, which exudes both warmth and professionalism, can work wonders in boosting patient confidence.

A properly designed office can often soothe the fears of patients with deep-rooted anxiety about visiting the dentist. Indeed, ergonomics, properly applied to dentistry, can deliver that seemingly elusive good: a high-trust, low-fear atmosphere. And that, in turn, will make the dental experience more positive for your patients, providing you with an on-going source of referrals.

## Summary

The ergonomic dental office is designed around the people who work there on a daily basis as well as the patients it serves. Because it is attractive, functional, esthetic and comfortable, it cultivates happy, productive dental teams and relaxed, contented patients.

An ergonomic office enables people to move about freely, with easy access to the materials and equipment they need. And it encourages staff to take pride in their jobs, an activity that occupies more than half of their waking hours. In other words, the ergonomic office is not a luxury; it's an essential.



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# Announcements

## NATIONAL HIGHLIGHTS

**May 3-7, 1992**  
Les journées dentaires  
(514) 875-8511

**May 14-16, 1992**  
ODA Spring Meeting  
(125th Anniversary)  
Toronto, Ontario  
(416) 922-3900

**May 29-30, 1992**  
Dental Association of PEI  
Annual Meeting  
(902) 894-4022

**May 30, 1992**  
New Brunswick Dental Society  
(506) 452-8575

**June 4-7, 1992**  
College of Dental Surgeons  
of Saskatchewan Annual  
Convention  
(306) 244-2476

**June 18-20, 1992**  
Newfoundland Dental Association  
(709) 579-2362

**August 28-30, 1992**  
44th Annual Scientific Session  
Canadian Association of Orthodontists  
Calgary, Alberta  
(416) 491-3186

**August 29-September 2**  
1992 Canadian Dental Association  
Annual Convention  
Calgary, Alberta  
Christine Leadman  
(613) 523-1770  
(outside Canada)  
1-800-267-6364 (East)  
1-800-267-6354 (West)

## April/Avril 1992

**April 3-4: Southern Ontario Surgical Orthodontic Study Group Spring Meeting** in Windsor, Ontario. For more information, contact: Dr. Jeff Berger. Tel: (519) 258-2632.

**April 3-5: 4th Annual Conference on Special Care Issues in Dentistry.** Co-sponsored by the Federation of Special Care Organizations and the American Dental Association. Held in Chicago at the Sheraton Chicago Hotel and Towers. For details, contact: (312) 440-2660.

**April 6-11: 25th International Dental Show** in Cologne, Germany. For information, contact: Verband der Deutschen Dental Industrie e.V., Pipinstrasse 16, W-5000 Köln 1, Germany.

**April 8-12: XI International Conference on Oral and Maxillofacial Surgery** in Buenos Aires, Argentina. For information and registration, contact the Secretariat at the following address; XI ICOMS, Casilla de Correo 4437, 1000 Correo Central, Buenos Aires, Argentina.

**April 29-May 3: 8th Annual Scientific Sessions of the American Academy of Cosmetic Dentistry** in Palm Springs, Calif. For more information, contact: Barbara Jo Zoelle, The American Academy of Cosmetic Dentistry, 2711 Marshall Ct, Madison WI 53705. Tel: (608) 238-6529.

**April 30-May 1: An International Symposium** entitled "Restorative Dentistry - Toward the Year 2000". Presented by Dr. Stuart Isler and Dr. Mary Riley, being held at the Maurice and Gabriela Goldschleger School of Dental Medicine, Tel Aviv University, Israel. For more details, contact: Dr. Hart J. Levin, 2006 Bathurst Street, Toronto, Ontario, M5P 3L1.

## May/Mai 1992

**May 1-3: Academy of Sports Dentistry** meeting being held in Hartford, Connecticut. For information, contact: Dr. A.W.S. Wood, 1553 Randor Dr., Mississauga, Ontario, L5J 3C6. Tel: (416) 823-2008.

**May 7-8: Association Internationale Francophone de Recherche Odontologique 9th Colloquium** will be held at the University of Montreal in Montreal, Quebec. For

details, contact: Dr. Daniel Grenier, secretary of AIFRO, Faculté de Médecine Dentaire, Université de Montréal, Montréal, Québec. Tel: (514) 343-2385.

**May 9-13: 46th Annual Meeting of the American Academy of Oral Pathology** in San Francisco, California. For information, contact: Dr. John M. Wright, Secretary-Treasurer, American Academy of Oral Pathology, Baylor College of Dentistry, 3302 Gaston Ave, Dallas, Texas 75246. Tel: (214) 828-8110.

**May 10-13: Annual Conference of the Canadian Long Term Care Association** in Winnipeg, Manitoba. Inquiries, contact: Mary Peterson Elias, Continuing Education Division, University of Manitoba, Winnipeg, Manitoba, R3T 2N2. Tel: (204) 474-9923.

**May 14: University of Toronto Class of '67 Reunion** celebrating 25th year in the main ballroom of the Admiral Hotel in Toronto. For more details, contact: M. Naiberg, 8199 Yonge St., Suite 404, Thornhill, Ontario. Tel: (416) 889-0810.

**May 23-30: Travel and Learn Cruise to Alaska** departing from Vancouver, British Columbia on the Regal Princess. Contact: University of British Columbia, Continuing Dental Education, 105-2194 Health Sciences Mall, Vancouver, BC, V6T 1Z3. Tel: (604) 822-2627.

## June/Juin 1992

**June 13-20: Bermuda Dental Association Convention** in Paget, Bermuda. Limited attendance, for more information, contact: Lynne Brandon, CDA, CDR (519) 657-4306 or Jerry Sheppard (519) 434-1647.

## July/Juillet 1992

**July 1-4: 12th International Symposium on Dental Hygiene the Hague** will be held at the Netherlands Congress Centre in The Hague. For more information contact: Secretariat, Van Namen & Westerlaken Congress Organization Services, "Dental Hygiene Symposium", PO Box 1558, 6501 BN Nijmegen, the Netherlands.

## August/Août 1992

**August 7-10: 3RD Singapore International Dental Exhibition & Conference** in Singapore. For more details, contact: SDEC '92, Orchard Dental Centre Pte Ltd, 268 Orchard Rd, #05-07, Singapore 0923.

**August 9-14: 70th Annual Dental Association of South Africa Congress** in Sun City, South Africa. For information, contact: Helmut Heydt, DASA Congress, Private Bag 1, Houghton 2041, South Africa.

**August 20-25: Canadian Society of Forensic Science Annual Conference** will be held in Halifax, Nova Scotia. For more information, contact: Fredricka Monti, Canadian Society of Forensic Science, Suite 215 - 2660 Southvale Crescent, Ottawa, Ontario, K1B 4W5 or call: (613) 731-2096.



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# News Update

## 1991 FDI World Congress

The 79th FDI World Congress, held in Milan, Italy, last October, attracted 3,390 dentists from 78 countries. Canada's contingent included 126 dentists, with 202 dentists attending the annual event from Sweden, 108 from the United States, 187 from Japan, 186 from Finland and 178 from Germany.

Expodental '91, the dental trade exhibition held in conjunction with the congress, was equally well attended. Organized by the Union of Italian Dental Industries (UNIDI), it saw 38,232 dentists, technicians and auxiliaries visit the 370 exhibitors' booths.

Other events of note included the installation of Dr. Kazuo Yamazaki of Japan as FDI's new president and the election of Dr. Clive Ross of New Zealand as president-elect. A CDA past-president, Dr. William Thompson of Trenton, Ontario, continues to serve as FDI's treasurer.

Berlin, Germany, will be the site of the 1992 FDI Annual World Congress, September 21-25, with Gothenburg, Sweden, slated to be the host city in 1993. In 1994, the congress will be held in Vancouver, B.C., from October 2-8.

## B.C. Dentists Sponsor Campaign for Chinese Community

The Chinese community is the focus of a new dental awareness campaign organized by the College of Dental Surgeons of British Columbia.

In January, the college initiated a series of radio advertising messages, broadcast in Cantonese, to inform listeners about oral health concerns. The campaign will also include a weekly Cantonese-language feature program, which will air on Vancouver's multicultural radio station, CJVB. Segments of the show will include information on children's dental care, the treatment of gum disease, and accessing dental care, among other topics.

"We want to be relevant to specific needs of the community," said Dr. John Hung, a spokesperson for the college. "For instance, the Western diet includes many foods with a high sugar content. New immigrants may experience cavities for the first time as a result of the change in their diet.

"Another example has to do with fluorides. The community water supply is not fluoridated in Vancouver. There-



*CDA delegates represent Canadian dentists at the 1991 FDI meeting in Milan, Italy. Left to right: Dr. Gilles Dubé, CDA's FDI national treasurer; Dr. Les Allen, CDA president; and Mr. Jardine Neilson, CDA executive director.*

fore, Hong Kong immigrants, who previously lived in a fluoridated city, must now find alternatives."

Some aspects of the overall awareness campaign, which will include public speaking presentations in Mandarin and Cantonese, are being developed with the assistance of the Chinese-Canadian Dental Society, and local public health departments.

## U of T Ortho Department Wins Top U.S. Awards

Two of the American Association of Orthodontists' most prestigious awards will be presented to a pair of investigators from the University of Toronto's orthodontic department this spring.

Drs. Luisa Greppi and Gerry Angelopoulos will receive their awards in May, during the association's annual meeting in St. Louis, Mo.

Dr. Greppi is the winner of the Milo Hellman Award, the association's highest award for experienced researchers. It is typically presented to investigators at the PhD level. Dr. Greppi's research supervisor was Dr. Dennis Smith.

Previous University of Toronto winners of this award include: Dr. Bernard Hemrend, 1953; Dr. Donald Woodside, 1970; and Dr. John Voudouris, 1989.

Dr. Angelopoulos will receive the Harry Sicher Award, which is given to first-time investigators. His research supervisor was Dr. D. Woodside.

Dr. David Bachmayer of the University of Toronto won the Sicher Award in 1988.

## McGill Dental Faculty Faces Tough Conditions



*Strathcona Medical Building, McGill*

Last July, when the principal's advisory group at McGill University recommended closing the school's dental faculty following the 1995 graduation exercises, the faculty was plunged into a state of shock.

Since then, the Academic Planning and Priorities Committee (APPC) has heard representations from both the faculty and the dental community on the closure proposal. Its recommendations, outlined below, have been accepted by the university senate and will come before the board of governors in late February:

The APPC subcommittee on planning and priorities unanimously recommends that no students be admitted to the faculty of dentistry after the 1992-93 academic year and that the faculty be closed on August 31, 1996, unless all the conditions enumerated below have been met by September 30, 1992.

1. The faculty must propose adjust-



ments to the undergraduate program to allow the education of 24 students per year using a 24-chair clinic in a four-year program.

2. The faculty must develop and seek approval of one new master's program; the subject matter should be selected so as to allow for a significant research component and meet urgent needs in society; and that program must be designed to admit a number of students sufficient to make it financially viable.

3. The faculty and the vice-principal (academic) must agree on a plan to ensure the renewal of about one third of the full-time academic staff, through appropriate retirement arrangements to become effective before August 31, 1995, so as to allow the faculty to hire research-oriented staff.

4. The faculty must conclude new arrangements with the dentists who presently act as academic casuals and with other dentists who have expressed strong support for the faculty, in order to reduce substantially the present budget of \$613,000.

5. The faculty and the vice-principal (academic) must agree on specific goals and criteria for academic performance to be achieved by 1997, and on the means necessary to meet these goals.

6. The faculty must propose a new fee schedule for services so that the clinic can operate on a fully-financed basis in the future.

7. The faculty and the university must agree on a plan to provide the necessary space for the clinic and for research activities through rental at the Montreal General Hospital, or any other appropriate location eligible for government financing of the rental and renovations costs.

8. The faculty, with the support of the university, must assure, through private funding, the acquisition of new dental chairs and the associated equipment necessary to support the dentistry teaching and research programs.

9. Compliance with the foregoing conditions must not entail any increase in transfers to the base budget of the faculty.

While the committee's recommendations are extensive, the dental faculty is now convinced that it can survive. Dean Ralph Barolet said the nine conditions contained in the recommendations are all being carefully addressed, and that McGill's faculty of dentistry intends to maintain its proud history long into the future.

## Restorative, Perio & Implants Tie in Cont. Ed. Mail Count

For the third year in a row, a *Journal* reader has reported on the number of continuing education pamphlets that arrived at his office in 1991.

The results indicate that the recession may have taken its toll on course organizers last year, as the number of mailings dropped to 75 in 1991 compared to 110 in 1990. The biggest change was in orthodontics, which dropped to two course pamphlets from 13.

| Discipline                 | 1991 | (1990<br>in brackets) |
|----------------------------|------|-----------------------|
| Restorative                | 10   | (15)                  |
| Implants                   | 10   | (10)                  |
| Periodontics               | 10   | (7)                   |
| Practice Management        | 8    | (11)                  |
| Cosmetic Dentistry         | 6    | (7)                   |
| Occlusion & TMJ            | 5    | (7)                   |
| Oral Surgery               | 5    | (2)                   |
| Geriatrics                 | 4    | (3)                   |
| Orthodontics               | 2    | (13)                  |
| Endodontics                | 2    | (6)                   |
| Oral Medicine              | 2    | (5)                   |
| Infection Control          | 2    | (2)                   |
| Removable                  |      |                       |
| Prosthodontics             | 0    | (3)                   |
| Ethics                     | 1    | (1)                   |
| Catalogues of              |      |                       |
| Multiple Courses           | 4    | (9)                   |
| Other (CPR, Sedation, etc) | 4    | (14)                  |

## Dr. Bruce Graham Appointed Dean at Detroit-Mercy



Dr. Bruce Graham

Dr. Bruce Graham, the associate dean for academic affairs at Dalhousie University, has been appointed dean of the fac-

ulty of dentistry at the University of Detroit-Mercy, effective February 28th.

A staff member of Dalhousie's dental faculty for 14 years, Dr. Graham earned a doctor of dental surgery degree from the University of Toronto in 1970. In 1972-74, he undertook graduate training at Ohio State University, earning a master of science degree in prosthodontics.

## MRC Offers AIDS Research Fellowships

The Medical Research Council (MRC) and the National Health Research and Development Program (NHRDP) have announced a joint fellowship program to support investigators interested in pursuing research on the acquired immunodeficiency syndrome (AIDS).

The fellowships will be restricted to the basic biomedical and clinical health science disciplines. Candidates must hold either a PhD in a health sciences research field or a professional degree (MD, DDS/DMD, DVM, or PharmD), as well as a master's degree in an appropriate health sciences research field. Postdoctoral fellows participating in the program will receive a fixed stipend of \$35,000 per year.

Applications will be accepted until April 1 and November 15, 1992. Further information may be obtained by contacting MRC in Ottawa; telephone, (613) 954-1960.

## Sporicidin Recalled

As a result of the joint actions of three U.S. government agencies, a voluntary product recall has been issued for Sporicidin Cold Sterilizing Solution.

The agencies involved have asked the manufacturers of Sporicidin Cold Sterilizing Solution to clarify concerns regarding the product's sterilizing claims.

Mr. George Rhodes, a spokesman for Dentsply International, which distributes the sterilizing solution under a licence agreement with Sporicidin International, noted that the agencies' actions are directed at the product's sterilant claims, not its disinfection claims.

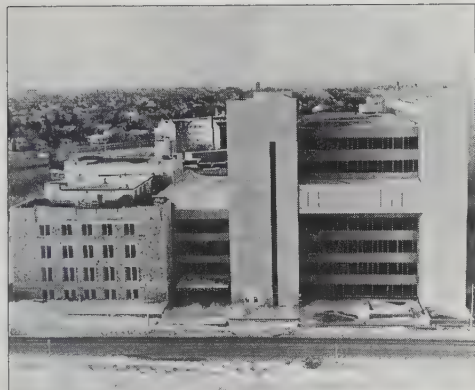
"Most dentists use the product for disinfection, not for sterilization as a hospital would. Hopefully, the problem will be settled soon," he said.

In a letter sent to all dentists in Canada, Mr. Stewart Canon, vice-president and general manager of Caulk Canada, emphasized that the recall only affected the Sporicidin Cold Sterilizing Solution, and not Sporicidin Disinfectant Spray or Disinfecting Towelettes. He advised Ca-



nadian dental offices to return their stocks of Sporicidin Cold Sterilizing Solution to their dealers for full credit.

## Dental Deans Leave Saskatchewan



*The University of Saskatchewan's dental college is based in the Health Sciences Building.*

Dean Dr. Peter Innes and associate dean Dr. David Singer have both announced that they plan to leave the University of Saskatchewan's dental college.

Dr. Innes, a member of Saskatchewan's dental college for 24 years and its dean for the past six, has accepted a similar position at his alma mater, the University of Otago, in New Zealand. He received his BDS from Otago in 1963, a master of dental science in 1967 and a doctorate in dental science in 1979.

Dr. Singer, a 1964 graduate of the University of Alberta, is returning to the faculty of dentistry at the University of Manitoba, where he received graduate training in oral biology and periodontics in 1973. He will head the Manitoba faculty's department of stomatology.

Although Drs. Innes and Singer are leaving Saskatchewan amid lingering doubts over the future of the university's dental faculty, both men claim that their moves are consistent with normal career opportunities and new challenges.

The Saskatchewan college of dentistry, which plans to celebrate its 25th anniversary next June, had a setback last spring when a university internal review committee recommended its closure. A concerted effort by the faculty and the dental community won the day, however, and Canada's second youngest dental faculty was saved.

## Ontario Oral Surgeon Donates \$7,500 to CFDE

A Kingston, Ontario, oral surgeon has donated \$7,500 to the Canadian Fund for Dental Education (CFDE).

Dr. Kenneth W. Lawless made the contribution to CFDE as an expression of his appreciation of professional support to referring dentists in the Kingston-Belleville-Brockville area.

His \$7,500 donation to CFDE has been allocated to the "Dr. Ken W. Lawless Developing Fund." Once the fund reaches \$10,000, it will become a named endowment fund, and the interest it earns will be directed toward worthwhile programs in dentistry.

Given that Dr. Lawless plans to make yearly donations to CFDE for an unspecified period of time, the developing fund should become an endowment fund soon. As Dr. Lawless's future donations increase the size of the fund, its impact on dental education in Canada will become increasingly significant.

CFDE praised Dr. Lawless for his in-

itiative on behalf of the dental profession in his area and for his staunch support of the fund and its programs.

CFDE is calling on dentists throughout Canada to develop equally innovative programs in support of the fund and the promotion of dental excellence in Canada.



## Erratum

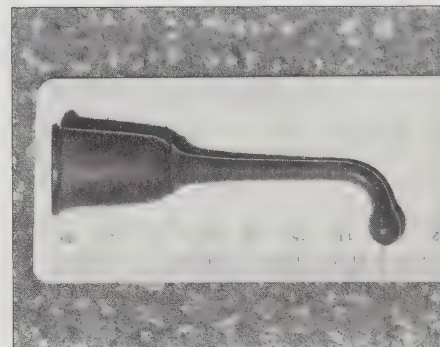
In the January 1992 "News Update" story, "Ottawa Dental Society Sponsors Free Mouth Guard Clinic," **Space Maintainers Laboratories Canada Limited**, an Ottawa-based laboratory, was inadvertently omitted from the list of firms who graciously donated personnel and equipment to the successful community exercise. The *Journal* apologizes for the oversight.

## "WHAT'S IT"

### THIS MONTH'S MYSTERY

This month's mystery item has many of us baffled. About three-inches long and made out of a plastic-like material, it is believed to have been a common instrument around the turn of the century.

If you can help to identify this device, please contact Dr. P. Ralph Crawford, *Journal* Editor, 1815 Alta Vista Drive, Ottawa, Ontario, K1G 3Y6.

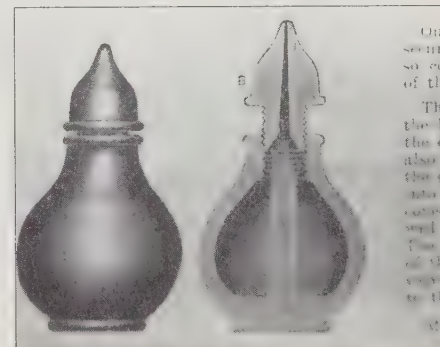


## DECEMBER

### "WHAT'S IT" SOLVED

December's mercury container mystery was easy to solve. The item was identified by Drs. A.J. Yule, Burnaby, B.C.; James A. Guest, London, Ont.; Vinh Nguyen, Brossard, Que.; Ricardo Schwedhelm, Vancouver, B.C.; M.J. Richards, Agincourt, Ont.; Eugene Van Der Haegen, Victoria, B.C.; Ian M. Alexander, Victoria, B.C.; and R. Hrabar, North Vancouver, B.C.

A photograph from a 1917 S.S. White dental catalogue depicts the company's mercury holder No.



3, available in boxwood or ebony, which could be purchased empty for 50 cents or complete with two ounces of mercury for 80 cents.



# CDSPI Reports

## CDSPI Announces DOMS II: The system That Offers You a Great Deal

The Canadian Dental Service Plans Inc. (CDSPI) board of directors has authorized an entirely new approach to its Dental Office Management System (DOMS) for 1992.

DOMS was officially introduced to Canada's dental profession in October 1987. It was developed by CDSPI to provide a computerized dental office management system that combined excellent value and exceptional service. CDSPI continues to believe that the dentists of Canada deserve no less in a computer system. In keeping with these original principles, CDSPI is pleased to announce a new approach to DOMS that we call DOMS II.

DOMS II is the result of four years of development and experience in the marketplace. With DOMS II, we can now offer a number of program options, each designed to meet the needs of today's dental practices in terms of quality, service and, most importantly, value.

For example, with DOMS II prospective buyers can choose from various software modules, allowing them to purchase only those DOMS' programs that best suit the needs of their practice.

### DOMS II Base Package Price: \$10,895

The DOMS II base package includes everything you need to get started in the computerization of your practice: a 386 Compaq computer, monitor, printer, modem, software, installation, 25 hours of software training in your office\* and lots more. This system is multi-user and multi-task orientated, so that when your office expands, you can too.

With DOMS II, you can zip through previously frustrating chores like claims statements, patient recalls, day sheets and day ends. You can call up financial data (trial balances, overdue accounts receivable, profit and loss statements). And at the touch of a key, you and your staff can use the time you've saved to prospect for hidden profits in your practice.

### Software Modules

DOMS II offers you six additional software modules that you may wish to incorporate into your system. The modules are: an appointment manager, treatment planning and pre-determination, general ledger, word processor, data base report generator

and EDI (electronic data interchange). Each of these modules are packed with useful features that would benefit any practice. However, you can elect to purchase only those that suit your requirements, all of them, or none at all. The choice is yours.

### Unlimited Software Support – Toll Free

All DOMS II purchasers are entitled to a software support contract that will provide them with unlimited software support via our toll-free telephone line. For years, dentists across Canada have agreed that DOMS provides the best, most reliable, telephone to telephone software support available.

### Software Updates

All DOMS II purchasers will receive one major software update each year. You are guaranteed that your software will be kept completely up to date and, if a problem should arise with your software, it will be fixed immediately.

### EDI on DOMS II

As the first vendor to be certified on both CDA EDI networks, CDSPI is one of the leading suppliers of this technology across Canada. EDI is available in modular format, so that you can purchase it now or later as your needs indicate. With DOMS II, you will find that EDI is an affordable, cost saving addition to your practice.

These are just some of the many new ways through which DOMS II provides the dental profession with practical, and affordable, features and service. CDSPI believes the creation of DOMS II is a significant step forward in bringing the benefits of computerization to all dentists.

If you agree, you can get more information about DOMS II, or arrange for a personal demonstration, by calling CDSPI today – toll free. Ask for Nancy Hurtle.

*\*Price may vary for education depending on location of your practice.*

## CDA Retirement Savings Plan

Unit values: (Funds are valued weekly)

| Fund                 | Unit values as at |                   |
|----------------------|-------------------|-------------------|
|                      | January 31, 1992  | December 31, 1991 |
| Bond & Mortgage Fund | 92.10416          | 92.31879          |
| Common Stock Fund    | 18.10562          | 17.96556          |
| Money Market Fund    | 59.30369          | 58.97635          |
| Balanced Fund        | 35.51313          | 35.31649          |

| G.I.C. Fund Term | *Interest rates as at |                   |
|------------------|-----------------------|-------------------|
|                  | January 31, 1992      | December 31, 1991 |
| 1yr              | 6.85%                 | 7.10%             |
| 2yr              | 7.35%                 | 7.60%             |
| 3yr              | 7.85%                 | 8.10%             |
| 4yr              | 8.10%                 | 8.40%             |
| 5yr              | 8.35%                 | 8.60%             |

(\*rates subject to change without notice.)

Total Assets (market value) of the Plan as of

| January 31, 1992 | December 31, 1991 |
|------------------|-------------------|
| \$155,037,364.70 | \$151,709,588.80  |

For further information:



Write:  
**CDSPI**  
Retirement Services Dept.  
Suite 710  
100 Consilium Place  
Scarborough, Ontario  
M1H 3G8

or phone, toll free:

416-296-9401  
1-800-561-9401  
Metro Toronto  
Service in English  
Extensions:  
252, 253, 254  
Service in French  
Fax.  
1-800-665-9401  
1-416-296-8920



# The DAP Advisor

*The DAP Advisor offers information, ideas and advice to improve dentist/patient communication, raise awareness about good dental health, and help your practice become busier.*

## April is Dental Health Month

April is Dental Health Month, the one month of the year set aside to increase Canadians' awareness of good dental health. It's the month when we "celebrate the smile" and help patients to "keep smiling," using a variety of promotional and educational materials. Throughout April, we remind Canadians of the pivotal role the dental team plays in keeping their teeth good for life.

Dental Health Month is also the perfect time to reflect on how effective you've been in communicating the importance of good dental health to your patients.

It's not always easy to know if you're getting the message across. Effective communication, after all, is more than simple cause and effect – you giving patients information and them adopting better dental health practises. It's a subtle, long-term process of building rapport, inspiring confidence, and educating people about how – with your help – they can achieve good dental health. It doesn't happen overnight.

One tried-and-true way to determine how effectively you are communicating with your patients is to ask them for their feedback straight out, either person to person or via a questionnaire. When well designed and carefully administered, both the interview and questionnaire are excellent sources of information about your communication effectiveness.

But there is a faster way to get a "snapshot" of your practice. Put yourself in your patients' shoes for a few minutes. Visualize yourself walking into your office, talking with your receptionist, sitting in your waiting room, settling into your dental chair, undergoing treatment, and then dealing with the paperwork on the way out. Now, still looking at your practice from the point of view of your patients, consider the following statements and indicate your agreement or disagreement with each one. Think carefully before you respond, and try to keep that "patient perspective" as you do so.

**April is Dental Health Month! Make sure you and your dental team are ready to join in the Celebration of the Smile. Here are some great ideas:**

- Order Keep Smiling buttons from CDA and hand them out to all your patients.
- Use CDA's Five Point Prevention Plan appointment cards to notify patients of their next appointment.
- Take photos of smiling patients and post them on your wall or bulletin board.
- Put crayons and construction paper in your waiting room and invite children to draw or color a picture of their biggest smiles.
- Dress up your office with Keep Smiling balloons and Celebration of the Smile posters.

|                                                                                                                       |                                   |                                      |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------------------|
| When I come into the operatory, my dentist immediately puts me at ease.                                               | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |
| My dentist is approachable and really listens to what I have to say.                                                  | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |
| My dentist encourages me to adopt good dental health practices, but I never feel like I'm being judged or reproached. | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |
| My dentist is always willing to discuss my concerns; he/she never belittles my fears.                                 | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |
| No matter how busy he/she is, my dentist never makes me feel rushed.                                                  | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |
| When my dentist discusses dental matters with me, I feel like it's a dialogue, not a monologue.                       | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |
| My dentist usually spends time at the beginning or end of my appointment to talk about my dental health.              | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |
| I get the feeling that my dentist and the entire dental team care about me as a person, not simply as a patient.      | Agree<br><input type="checkbox"/> | Disagree<br><input type="checkbox"/> |



*The DAP Advisor is a service of CDA's Dental Awareness Program, an ongoing campaign dedicated to helping all Canadians keep their teeth Good For Life.*

*\* Back by popular demand. This DAP Advisor was first published in the April 1990 issue of the CDA Journal.*



# Library/Bibliothèque

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## L'Utilisation et l'interaction de médicaments

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## New Library Acquisitions

### Books

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2. Johnson, N.W. *Dental caries: markers of high and low risk groups and individuals*. Vol 1, London, NY : Cambridge University Press, 1991.

### Videos — VHS

1. *Cements*, Provo, Utah : Practical Clinical Courses, c1988. 59.36 min.
2. *Direct resin inlays and onlays*, Provo, Utah : Practical Clinical Courses, c1988. 57.30 min.
3. *Fluoride : professionally applied and*

*home-use*, Provo, Utah : Practical Clinical Courses, c1990. 60 min.

4. *Impression materials and techniques for fixed prosthodontics*, Provo, Utah : Practical Clinical Courses, c1988. 58.10 min.

5. *Making sense out of dentin adhesion*, Provo, Utah : Practical Clinical Courses, c1990. 60 min.

6. *Pathology of the temporomandibular joint and its classification*, [Hampstead, N.H.] : [Northeast Dental Seminars]. [1990]. 70.52 min.

7. *Post and core*, Provo, Utah : Practical Clinical Courses, c1988. 58.11 min.

8. *Simple temporary restorations for fixed prosthodontics*, Provo, Utah : Practical Clinical Courses, c1988. 57.24 min.

9. *Temporomandibular disorders : easy treatment for simple cases*, Provo, Utah : Practical Clinical Courses, c1990. 60 min.

10. *Tooth desensitization*, Provo, Utah : Practical Clinical Courses, c1989. 60 min.

## Audio Cassette

1. Richmond, Julius B. et al. *Dental caries prevention: the physicians's responsibility*. Detroit, produced by Wayne State University School of Medicine.

*One copy of the above package of articles is available for \$5.00 to all CDA members and for \$10.00 to non-members. (GST and, Ontario residents, please include 8% sales tax.)*

*Daily: 1-800-267-6354 (Western Canada and area code 709)*

*1-800-267-6364 (Eastern Canada excluding area code 709)*

*Envoy: CDN.DENTAL.LIB.*

*FAX: 613-523-7736*

*Les membres de l'ADC peuvent obtenir pour 5\$ et les non membres pour 10\$ une copie des articles de la bibliographie ci-dessus.*

*Aux heures ordinaires:*

*1-800-267-6354 (l'ouest du Canada et la région dont le code est 709)*

*1-800-267-6364 (l'est du Canada sauf la région dont le code est 709)*

*Programme informatique*

*Envoy: CDN.DENTAL.LIB*

*Bélinogramme: (613) 523-7736*



# Calgary 1992 • August 29 - September 2

## CONVENTION UPDATE

### Scientific program tackles the issues



Calgarians, with their warm western hospitality, have long enjoyed an outstanding reputation for hosting visitors from all over the world. Home of the Calgary Stampede, the Greatest Outdoor Show on Earth and the best ever 1988 Olympic Winter Games, Calgary is truly a world class city. We are very proud to host the 1992 CDA Convention and plan to make it the most successful CDA Convention ever.

In designing the Scientific Program a special emphasis has been placed on the ever-changing world of dentistry. In recent years dentistry has been plagued by crisis after crisis, each one affecting our daily lives. These include the controversy surrounding mercury and amalgam, the AIDS dilemma with the accompanying media hysteria, more fluoride controversy, and our stumbling economy with its economic and social consequences. The Scientific Program has been designed to respond to these changes with an update on current information about all aspects of dentistry. The participation of the Canadian Dental Hygienists Association and Canadian Dental Assistants Association has resulted in many lectures being designed specifically for the Hygienists and Assistants as well as the Administrative personnel.

There are more than 35, two-hour lectures and numerous table clinics scheduled over the 4 1/2 day program. There are also the popular "hands-on" courses which offer on-the-spot practical experience to complement the theoretical lecture. The CDA Exhibit Hall will round out the Scientific Program by affording a first-hand look at the latest technology and services available.

All work and no play makes for a dull day. To counteract this, in true Calgary style, we have meshed an exciting, Western-style social program with a top-notch Scientific Program to ensure that the 1992 CDA Convention will be a memorable one.

The dentists of Calgary and the CDA look forward to welcoming you, your families and staff to our exciting city this August. Come and experience the west!

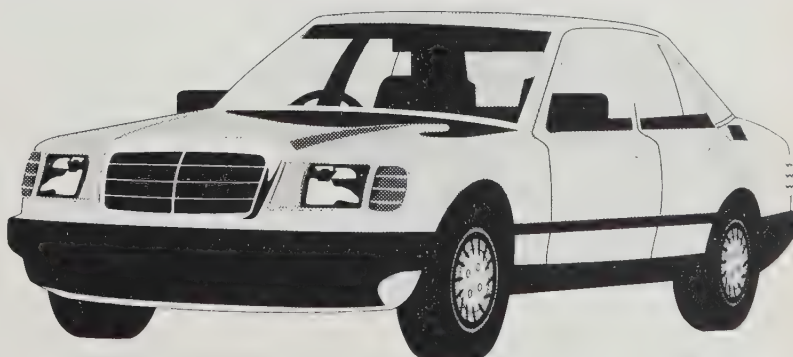
*Bill Kearns, D.D.S.  
Chairman, Scientific Program  
1992 Convention Committee*



**Olympic Plaza & Calgary's Municipal Building**  
This beautiful area was the site of the nightly awards ceremonies at the 15th Olympic Winter Games. During the winter you can skate and during the summer the skating rink is converted into a fountain. Olympic plaza hosts special events and festivals year-round. (Photo courtesy of Calgary Convention & Visitors Bureau)

# WIN A CAR!

... and other valuable prizes throughout the 4 1/2 day convention.



Special thanks to Aurum / Classic Dental Laboratories, sponsor of the 1992 Grand Prize.



## Calgary 1992

### Limited attendance Pre-convention Courses



Saturday, August 29

**Jennifer de St. Georges**  
Monte Sereno, California

#### A.M. "Handling Key Time Management Problems"

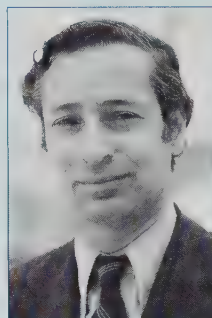
Time management is the key to a successful practice. Subjects to be covered:

- Scheduling problems
- Nine golden rules for handling office emergencies
- 24 benefits of a five-minute morning meeting

#### P.M. "Taking the Risk out of Risk Taking"

The lecturer will present participants with a prescription for tomorrow's practice.

- Giving patients quality of care
- Moving the dental practice to the next level of management



Saturday, August 29

**Howard Martin, D.M.D.**  
Silver Spring, Maryland

#### "High Tech Root Canal – Flare, File, Fill"

Hands-on – Limited Attendance  
Sponsored by CAULK CANADA

This course will increase your clinical experience in technological advances to do more endodontics with ease, effectiveness and efficiency.

- Caviendo ultrasonic endodontics
- Endotec & warm lateral condensation
- Control Safe end K/H file & handle
- M series automated canal orifice opener
- 2 in 1 endo access bur for penetration and opening
- Curved canal management
- One appointment endodontics



Saturday, August 29  
Sunday, August 30

**Jay R. Friedman, D.D.S.**  
Los Angeles, California

**Gary R. O'Brien, D.D.S.**  
Los Angeles, California

#### "Surgical and Prosthetic Implants"

Hands-on – Limited Attendance  
Sponsored by DENTSPLY/CORE-VENT

On the first day, the course will concentrate on the current knowledge and information relating to the surgical placement of cylindrical endosseous fixtures. Restorative implant dentistry through the use of different components will be reviewed. Evaluation and treatment planning procedures for single tooth, partially edentulous and completely edentulous patients will be discussed. Fabrication of stents will be shown. The methods of connection between natural teeth and implants, if needed, will be reviewed.

The second day of this course will feature surgical and prosthetic hands-on training.



Sunday, August 30

**Terry Donovan, D.D.S.**  
Los Angeles, California

#### "Esthetic Restorative Dentistry and Materials Update"

Topics to be covered include:

- Essentials for soft tissue esthetics on fixed prosthodontics;
- Effective gingival displacement;
- New materials and techniques for fabrication of provisionals;
- Review of impression materials;
- New impression techniques;
- Solutions for fractured porcelain: metal bonding - mystery & myth;
- Current thoughts on bonding to tooth structure;
- Conservative esthetic techniques: bleaching, enamel microabrasion;
- Bonded porcelain: veneers, inlays/onlays, use in oral rehabilitation;
- Other current topics.



# Calgary 1992

## Preliminary Convention Program

The Convention Program is designed for all dental professionals: Dentists, Hygienists, Assistants, Technicians, Administrative Personnel, Spouses and Children. Some courses will be of particular interest to certain groups, however, many courses will be of interest to more than one group. As the convention date draws nearer we will suggest those sessions which may be of special interest to specific members of the dental team.

Monday, August 31 • Tuesday, September 1 • Wednesday, September 2 (a.m. only)

**75TH ANNIVERSARY OF  
THE FACULTY OF DENTISTRY AT THE  
UNIVERSITY OF ALBERTA**

*"Dental Implantology –  
A Team Approach for Success"*

**Charles Baker, D.M.D., M.Sc., F.R.C.D.**

*"Contemporary Radiographic Techniques in  
Assisting in Effective Implant Utilization"*

**Sharon Compton, D.D.S., B.Sc., M.A.**

*"The Challenge and Importance of Plaque-Free  
Implant Fixtures"*

**Keith Compton, D.D.S., B.Sc., M.S.**

**Christopher Robinson, D.D.S., F.R.C.D. (c)**

*"Complications with Dental Implants –  
This Could Never Happen to Me ..."*

**Jack Stockton, D.M.D., C.F.P., M.B.A.**

Winnipeg, Manitoba

*"Financial Planning for your Dental Practice"*

**GRIEVE MEMORIAL LECTURE**

**Robert L. Boyd, D.D.S., M.Ed.**

San Francisco, California

*"Surgical, Restorative, and Splinting Procedures for  
Stability in the Post-Orthodontic Occlusion"*

**Alan R. Milnes, D.D.S., Dip. Paed., Ph.D.**

Toronto, Ontario

*Paediatric Dentistry*

**Ken A. Neuman, D.M.D.**

Vancouver, British Columbia

*"Cosmetic Imaging – The Ultimate  
Communication Tool"*

**Roy C. Page, D.D.S., Ph.D.**

Seattle, Washington

*"Frontiers in Periodontics: From the Laboratory  
to the Clinic"*

**Mary Krywulak, D.M.D., M.S.**

Ottawa, Ontario

... and more to come!

**John McDougall, M.D.**

Santa Rosa, California

*"Nutrition for the Dental Patient"*

**John Molinari, Ph.D.**

Detroit, Michigan

*"Infection Control in a Changing World"*

*"Hepatitis B and AIDS: Challenges to Infection Control"*

**Annette Ashley Linder, R.D.H., B.S.**

Richmond, Virginia

*"Developing a Successful Hygiene Department"*

**Anita Jupp**

Burlington, Ontario

*"New Horizons for the Accelerated Practice of the 90's"*

**Hygienists' Report**

presented by the C.D.H.A.

**Claude Lamarche**

Montreal, Quebec

*"Prothèse complete" et "Prothèse partielle amovible"*

**Ronald Jordan, D.D.S., M.S.D.**

Winnipeg, Manitoba

*"Restorative"*

**Edward Kisling**

Vancouver, British Columbia

*"Credit and Collection"*

**Steven Lewis, D.D.S.**

Los Angeles, California

*"Esthetic Considerations in Restoring  
Osseointegrated Implants"*

**Donald Yu, D.M.D., M.Sc.D., C.A.G.S.**

Edmonton, Alberta

*"Micro Tissues, Macro Issues: How to Feel,  
Fill, Thrill Accessory Canals"*

**Harold Goodis, D.D.S., Diplomate of the  
American Board of Endodontics**

San Francisco, California

*"Lasers in Endodontics"*

**Joel White, D.D.S., M.S.**

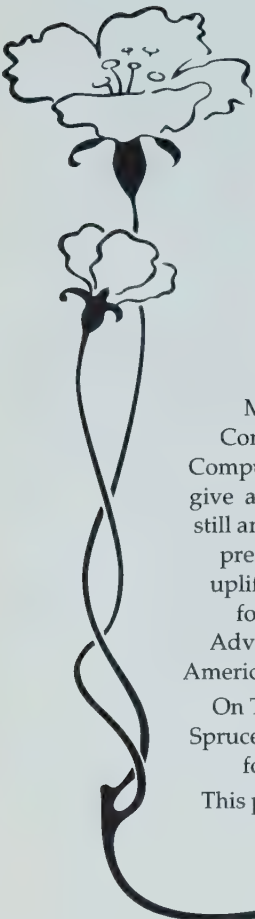
San Francisco, California

*"Research and Lasers: Clinical Effects"*

... and more to come!



## Calgary 1992



### Spouses' Program

**Monday, August 31 and  
Tuesday, September 1**

A full program of lectures,  
tours and entertainment!

Make your attendance at CDA  
Conventions a learning experience.  
Computer expert Lauralynn Mealing will  
give an overview of Home Computers ...  
still an unsolved mystery for many. This  
presentation will be followed by an  
uplifting talk given by Sharon Wood,  
founder of the One Step Beyond  
Adventure Group and the first North  
American woman to climb Mount Everest.

On Tuesday, enjoy a day outdoors at  
Spruce Meadows, famous the world over  
for its equestrian competitions.

This programme includes two lunches.  
... and more!

### Social Program

**Sunday, August 30, 1992**

#### OPENING CEREMONY

**Sponsored by Ash Temple / Servident**

Featuring a "Variety Show" of western talent  
performed in the Jack Singer Hall  
(Space is limited to the first 1,600 registrants)

**Monday, August 31, 1992**

#### STAMPEDE RODEO NIGHT

Put on your western duds and get ready for a  
real live "rodeo show". Gun-toting, steer-roping  
cowboys will revive the "old-west" days right before  
your eyes. Later, a little grub and dancing in the  
dirt to round-up the evening. Cash bar.

**Tuesday, September 1, 1992**

#### FORMAL GALA - WESTERN STYLE

This traditional black-tie dinner/dance  
... is going Western!

Combine your Tuxedo jacket, shirt and tie  
with your jeans and cowboy boots and hats  
... that goes for ladies too!

### Tots ... Children ... Teens

A program designed for our  
"growing" Convention Delegates

To respond to our delegates' needs, we have restructured  
our children's program into three age groups:

**Tots (ages 2 - 4)**

Fun and games at a downtown  
drop-off centre

**Children (ages 5 - 12)**

A fun-filled two days encompassing  
the mystery of the prehistoric past  
at the Tyrrell Museum and the  
thrills of today at Calaway Park.

**Teens (ages 13 - 17)**

A two-day mountain experience  
through Roger's Pass with the  
Alpine Club of Canada  
(attendance is limited to first  
50 registrants).

*The Children and Teens program includes  
transportation and meals for both days.*



The Royal Tyrrell Museum of Palaeontology is a world-class museum that  
celebrates the evolution of life and includes one of the largest collections of  
dinosaur specimens in the world.

(Photo courtesy of Calgary Convention & Visitors Bureau)



## Calgary 1992

### Table Clinics

Table Clinics are defined as a brief table top presentation or demonstration of five to ten minutes duration using visual aids, and repeated over a 2 1/2 hour period.

Those interested in presenting, write to:

TABLE CLINICS  
CDA Conventions  
1815 Alta Vista Drive  
Ottawa, Ontario K1G 3Y6

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The CDA Convention Committee invites you to plan a 'class reunion' during the 1992 Convention. If you are interested in drawing together old friends and colleagues during the Convention, please write, outlining your requirements, to:

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Ottawa, Ontario K1G 3Y6

For more information or assistance in planning your reunion, call CDA Conventions at (613) 523-1770.



One of the finest equestrian show jumping facilities in North America, Spruce Meadows attracts top international riders. (Photo courtesy of Calgary Convention & Visitors Bureau)

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The west was built on the back of a horse and there is no other facility that celebrates Canada's heritage and the future of the horse as the Spruce Meadows Equestrian Centre. Three major annual tournaments attract virtually every Olympic, World and National Show Jumping Championship and is why Spruce Meadows is ranked third in the Equestrian World. The National is staged the first week of June, attracting riders from across Canada for the official Canadian Championships. Held during the Calgary Stampede in July, the Invitational encompasses all the aspects of competition for juniors and seniors in the hunter and jumper disciplines. The five-day Masters Tournament each September features the top six national teams in the world competing for over \$1,000,000 in prize money.

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Make plans to extend your 1992 CDA Convention experience from Calgary to Alaska! As you know, the 1992 CDA Convention will be held from August 29 to September 2, 1992 in Calgary. The Alaska Cruise Post-Convention tour is from September 3 - 9, 1992 aboard the MS NEW AMSTERDAM

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**DEADLINE TO REGISTER:** June 30, 1992.





# 1992 CANADIAN DENTAL ASSOCIATION ANNUAL CONVENTION

August 29 - September 2, 1992 • Calgary

## Hotel Reservation Form

**Please check appropriate category:**

☐ Dentist   ☐ Hygienist   ☐ Assistant   ☐ Office Personnel   ☐ Exhibitor (Company name: \_\_\_\_\_)

☐ Other (please specify) \_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ Province: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Telephone: (\_\_\_\_) \_\_\_\_\_ (\_\_\_\_) \_\_\_\_\_  
(Residence) (Office)

**Type of Room:**

☐ Single   ☐ Double   ☐ Twin   ☐ Other (please specify) \_\_\_\_\_

Special Requests: \_\_\_\_\_

**Indicate your hotel choice\* (by numbering the boxes):**

- ☐ Skyline Plaza Hotel (CDA Headquarters) ..... \$ 105.00 single / double  
☐ The Palliser (CDA Headquarters) ..... \$ 110.00 single / double  
☐ The International ..... \$ 100.00 single / double  
☐ Delta Bow Valley ..... \$ 115.00 single / double  
☐

\* Prices do not include GST or PST (5% PST in Alberta)

Arrival Date: \_\_\_\_\_ Departure Date: \_\_\_\_\_

Arrival Time: \_\_\_\_\_

**All changes and/or cancellations must be made through CDA Conventions (613) 523-1770.**

In order to reserve a room, a guarantee for the first night is essential. The guarantee will apply to the first night ONLY.  
To cancel your reservation advise the CDA at least three (3) days prior to your arrival.

☐ MasterCard   ☐ American Express   ☐ VISA

Card Number: \_\_\_\_\_ Expiry Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**Send Reservation Form to:**

CDA Conventions  
Canadian Dental Association  
1815 Alta Vista Drive  
Ottawa, Ontario K1G 3Y6

**DEADLINE for Reservations: July 10, 1992**



# CANADIAN DENTAL ASSOCIATION CONVENTION

Calgary • August 29 - September 2, 1992

## PRE-REGISTRATION FORM • Please PRINT

**ONE FORM PER PERSON.** To ensure your requests are accommodated - *register early.*  
Advance registrations will be accepted until **July 10, 1992** after which they will be returned to the sender. Each on-site registration will be subject to a \$27.00 administrative fee (GST included).

SURNAME: \_\_\_\_\_ FIRST NAME: \_\_\_\_\_ SEX: M F

ADDRESS: \_\_\_\_\_ (Street) \_\_\_\_\_ (City) \_\_\_\_\_ (Province)

(Postal Code) \_\_\_\_\_ TELEPHONE: ( ) ( ) ( ) ( ) ( ) ( ) (Residence)

CDA Membership Number: \_\_\_\_\_ License Number: \_\_\_\_\_

## PRE-CONVENTION • AUGUST 29, 30 • LIMITED ATTENDANCE

### SATURDAY, AUGUST 29

#### Jennifer de St. Georges - PRACTICE MANAGEMENT - Lecture

Dentist ..... \$ 155.00  
Staff ..... \$ 70.00  
**Howard Martin, D.M.D. - ENDODONTICS - Hands-on Program**  
Dentist (limited to 40 participants) ..... \$ 185.00

### SUNDAY, AUGUST 30

#### Terry Donovan, D.D.S. - RESTORATIVE - Lecture

Dentist ..... \$ 155.00  
Staff ..... \$ 70.00

#### Jay Friedman, D.D.S. & Gary O'Brien, D.D.S. - IMPLANTS - Hands-on Program

#### • TWO-DAY COURSE: SATURDAY AND SUNDAY •

Dentist (limited to 40 participants) ..... \$ 350.00

\* GST is not charged on Pre-convention courses / Lunch is included in Pre-convention courses.

### SUNDAY, AUGUST 30

#### CDHA

Dental Hygienist Workshop / Luncheon "A" ..... \$ 55.00  
Dental Hygienist Workshop / Luncheon "B" ..... \$ 55.00

## CONVENTION • AUGUST 31, SEPTEMBER 1 and SEPTEMBER 2 (a.m.)

#### ☐ DENTIST

Member, CDA or Alberta Dental Association ..... Nil  
Non-member, Others ..... (7% GST included) \$ 190.00

*Includes:* Scientific sessions, exhibits and two breakfasts

#### ☐ DENTAL HYGIENIST

CDHA Member ..... (7% GST included) \$ 80.00  
Non-member ..... (7% GST included) \$ 115.00

*Includes:* Scientific sessions, exhibits and two breakfasts

#### ☐ DENTAL ASSISTANT

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Non-member ..... (7% GST included) \$ 115.00

*Includes:* Scientific sessions, exhibits and two breakfasts

☐ **TECHNICIAN** ..... (7% GST included) \$ 80.00

*Includes:* Scientific sessions and exhibits and two breakfasts

☐ **ADMINISTRATIVE PERSONNEL** ..... (7% GST included) \$ 80.00

*Includes:* Scientific sessions and exhibits and two breakfasts

☐ **STUDENT** ☐ Dentist ☐ Hygienist ☐ Assistant ..... \$ Nil

*Includes:* Scientific sessions and exhibits

☐ **SPOUSE / GUEST** ..... (7% GST included) \$ 125.00

*Includes:* Scientific sessions, exhibits and Spouses' Program.

☐ **TOTS / CHILDREN / TEENS** ..... (7% GST included) \$ \_\_\_\_\_

Tots - Drop-off Centre \$3.00 /hourly ☐ Yes ☐ No

Children 5 - 12 years - \$80.00 / Teens 13 - 16 years - \$140.00 / \_\_\_\_\_

#### ☐ SOCIAL EVENTS

**Sunday - Opening Ceremony** - Subject to space availability

Will attend ☐ Yes ☐ No ..... \$ Nil

**Monday - Stampede Rodeo Night**

(per person) ..... (7% GST included) \$ 50.00

**Tuesday - President's Gala - "Western Formal"**

(per person) ..... (7% GST included) \$ 70.00

☐ **FUN RUN - Monday A.M.** ..... (7% GST included) \$ 20.00

☐ **GOLF TOURNAMENT -**

Friday, August 28 ..... (7% GST included) Golfer \$ 80.00

..... (7% GST included) Guest \$ 50.00

☐ **CDHA Reception and Banquet -**

Tuesday, September 1, 6:00 p.m. .... (7% GST included) \$ 50.00

☐ **CDAA / ADAA Awards Gala -**

Tuesday, September 1, 6:00 p.m. .... (7% GST included) \$ 25.00

**TOTAL** ..... \$ \_\_\_\_\_

The above registration fees are paid by \_\_\_\_\_

☐ I wish to pay the above total by credit card: ☐ MasterCard ☐ VISA ☐ AmEx

Card#: \_\_\_\_\_ Expiry date: \_\_\_\_\_

Signature of Cardholder: \_\_\_\_\_

☐ I enclose a cheque payable to the Canadian Dental Association.

**Post-dated cheques will not be accepted.**

**ACCOMMODATION**

☐ Hotel Registration Form enclosed for \_\_\_\_\_ (number of) rooms.

☐ Do not require a room

☐ Other arrangements made

*Mail registration form with payment to:*

1992 CDA Convention

1815 Alta Vista Drive

Ottawa, Ontario K1G 3Y6

**CANCELLATION POLICY:**

Cancellation received, in writing, on or before July 10, 1992 - full refund.

Cancellation received, in writing, after July 10, 1992 - subject to a 25% administrative charge.

No refund after August 9, 1992.

**Dentists, Assistants, Hygienists, Office Personnel & Technicians registering by July 10, 1992 will be eligible to win two tickets anywhere Air Canada flies in Europe and North America!**





## FDI 1992 WORLD CONGRESS- BERLIN, GERMANY



Berlin - 20.-26.9.1992  
FEDERATION  
DENTAIRE  
INTERNATIONALE

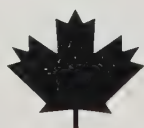
80. JAHRESWELTKONGRESS DER ZAHNÄRZTE  
80TH ANNUAL WORLD DENTAL CONGRESS  
80<sup>e</sup> CONGRES DENTAIRE MONDIAL ANNUEL  
80. CONGRESO ODONTOLÓGICO MUNDIAL ANUAL

The **1992 FDI World Dental Congress** will be held in Berlin, Germany, September 21-25, 1992, and the Canadian Dental Association has appointed **TourCan Inc.** as the official travel agency for the **1992 FDI World Dental Congress**.

TourCan will be offering two tour packages to Canadian dentists wishing to combine business with pleasure. You may select a pre-convention tour or a post-convention tour (the latter to include meetings and seminars with dentists from Egypt and area) to complement your attendance at the **1992 FDI World Dental Congress**.

The Pre-convention tour of Germany (September 12-23) will include a trip down the "Romantic Road," a Rhine Cruise and tours of Bavaria and Berlin. The post-convention tour (September 26 - October 4) will combine seminars and meetings with a cruise down the Nile River, and visits to Cairo, Luxor, Aswan and Abu Simbel.

Details on how you can register may be obtained through CDA Conventions. Call 1-800-267-6364 (East) or 1-800-267-6354 (West and area code 709).



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# Book Reviews

## Cariology, 3rd Edition

by Ernest Newbrun

1989, Quintessence Publishing Co., Chicago, Ill.

Dr. Ernest Newbrun's third edition of *Cariology* has been in print since 1989. It brings the previous edition up-to-date by including material on important developments in salivary research, new tests for food cariogenicity, new sweeteners, microbiological testing and new consumer dental products.

In addition, a new chapter discusses the role of fluorides in caries prevention. This was added, no doubt, in response to complaints from many educators that a single textbook dealing with all aspects of dental caries was not available. (How can one really talk about cariology without introducing some of the more basic concepts of caries prevention through fluoride therapy?) With this new edition, however, the book comes very close to being an all-round textbook in the area of dental caries.

Dr. Newbrun has always intended *Cariology* to be used by senior dental students, but it is simple enough for students taking introductory oral biology courses in lower grades to understand. On the other hand, the book is comprehensive enough to benefit students in graduate-level courses in cariology, because it offers a good selection of references for further reading.

I would not hesitate to recommend this book to practising dentists as a reference text. It falls short, however, in its coverage of the use and evaluation of different preventive techniques in clinical practice – this is definitely not a clinical “cookbook” instruction manual.

*Cariology* contains many new facts that fall into the “hey, I didn't know that!” category, even for those who have made cariology their specialty. It is loaded with the latest research advances in this area, and there is an excellent chapter dealing with the cariogenicity of foods. The chapter on sweeteners was very thorough and up-to-date, except that the new sweetener, sucralose, was not discussed.

Many texts that review the literature tend to be dry and verbose, but Newbrun's book is written in a style that will make it an acceptable, even enjoyable, read for most dentists.

The book is organized very logically.

First, the theories on the etiology of dental caries are reviewed, then the microflora and substrates involved are discussed (salivary components, enamel surface organic material, the enamel surface mineral, dietary components) and the biological mechanisms giving rise to mineral loss from the teeth are explained. This is followed by discussions on the effectiveness of caries activity tests, dentifrices, sealants and fluorides.

In the last chapter, Dr. Newbrun uses a public health prospective to discuss the control of dental caries and argues strongly that we have not yet controlled caries (it is well known that, in North America, a nearly equal amount of money is spent on the treatment of oral disease – caries and periodontal disease are still the two major causes of tooth loss – and the treatment of cancer or heart disease). Clearly, dental caries are not even close to being wiped out. There is still much to learn about this disease process and this textbook is a valuable resource for anyone interested in learning more about dental caries.

*Reviewed by:*

Hardy Limeback, PhD, DDS  
Associate Professor, Preventive  
Dentistry  
University of Toronto

## Dental Amalgam – A Health Hazard?

by Preben Horsted-Bindslev,  
Laszlo Magos, Palle Holmstrup  
and Dorthe Arenholt-Bindslev

1991, Munksgaard, Copenhagen

The authors of *Dental Amalgam – A Health Hazard?* don't answer the question posed by the book's title. Instead, the reader is provided with a very complete and unbiased review of the literature pertaining to this highly controversial issue, and encouraged to draw his or her own conclusions.

In eight short chapters, the authors review mercury metabolism and toxicology, how the dental team and dental patients are exposed to mercury, what the recommended safe levels of mercury are in air, blood and urine, and what levels are commonly found. The oral and systemic manifestations of mercury exposure are discussed, and a set of

excellent color plates illustrates many of the oral conditions associated with mercury reactions.

A very practical chapter on mercury hygiene in the dental office provides a wealth of information on how to reduce the exposure of the dental team and patients to mercury, how to monitor mercury levels and how to reduce mercury release into the community. Interestingly, the authors recommend dusting powdered silver or tin over a mercury spill to reduce vapor emission. In order to amalgamate with the spilled mercury, the metal powder must be triturated immediately before use to remove its naturally occurring oxide layer. Simply dusting powdered sulphur over the spill will also effectively suppress mercury vaporization.

The practitioner will find the section describing the devices available for removing amalgam scrap from office waste water – prior to its discharge into the sewage system – very interesting as well. It is anticipated that legislation to strictly control this type of waste disposal will soon be in place in Canada.

The final chapter discusses possible alternatives to mercury amalgam, and illustrates that many of these materials could also be potential health hazards. And since none of them have the same unique balance of properties as dental amalgam, none of them can completely replace it.

Although the book is strictly a review – devoid of any conclusions or new hypotheses – and does not contain any information not published elsewhere, researchers will find it an excellent resource since it contains 125 references. As it is easy to read, and a scientific background is not required to understand the text, this is the type of book that could be recommended to patients with concerns about dental mercury. These patients might find that appropriately selected sections would help to clear up the myths surrounding dental mercury.

In summary, this book is a “must read” for all dental practitioners or anyone else interested in the mercury-amalgam controversy.

*Reviewed by:*

Peter Williams, BA, MS, DDS  
Consulting Editor, Dental Materials



## Color Atlas of Porcelain Laminate Veneers

par George A. Freedman et  
Gerald L. McLaughlin

1990, Ishiyaku EuroAmerica Inc., St.  
Louis, Mo.

Ce volume à couverture rigide contient 237 pages, divisés en 13 chapitres, traitant de tous les aspects se rapportant aux facettes en porcelaine.

Les auteurs traitent de: la demande des soins dentaires esthétiques, la place qu'occupent les dents dans l'apparence générale du visage et l'image de soi (self-image). De l'historique dans le développement des facettes laminées en porcelaine; des facettes préformées en plastique «Mastique» à aujourd'hui.

L'adhésion mécanique et chimique et des différents aspects de l'apparence de l'émail mordancé vu sous le microscope, le traitement de la porcelaine à l'acide fluorhydrique, silanisation, etc.

Les indications et contre-indications des facettes en porcelaine.

Les différentes façons de préparation des dents, selon les circonstances, pour recevoir les facettes en porcelaine.

La partie clinique, telle que la taille des dents, les types de fraises à employer, la prise d'empreinte, la temporisation, l'essayage, l'adaptation, le traitement à l'acide orthophosphorique de la porcelaine pour le dégraissage, le mordantage de l'émail, la cimentation et le polissage final.

L'étude de la couleur en relation avec

les facettes en porcelaine, du système de modification de la teinte par addition et celui par la soustraction, du métamérisme et de la fluorescence. Les nouveaux instruments pour choisir la teinte des dents à restaurer. L'évaluation clinique, les techniques de photographie intra-orale, et les techniques modernes de «Imaging» pour aider le dentiste à planifier les cas, et communiquer aux patients les modifications cosmétiques projetées.

La prescription de laboratoire pour des cas de facette. Les étapes de la fabrication des facettes selon la technique de modèle coulé «Investment model technique» et la technique de la feuille de platine.

Les incrustations (Inlays) et des incrustations à recouvrement de cuspidés (Onlays).

Les possibilités sur l'évolution de ce type de traitement à l'avenir.

La qualité d'imprimerie est excellente. Les photographies sont nombreuses, d'excellente qualité et pertinentes. Les textes sont très faciles à lire et à comprendre. Les références sont pertinentes et à jour.

En résumé, c'est un excellent ouvrage concis, précis, complet et courant, intéressant tant pour les étudiants que pour les dentistes en pratique privée, qui sont appelés à fournir ce genre de service à leurs patients.

*Haig Baltadjian, DDS, M.Sc.D.*

*Faculté de médecine dentaire  
Département de dentisterie de  
restauration*

*Université de Montréal*

## Letters



### ■ Implants and Liability

Events occurring outside of the dental profession may lead to a reduction in the number of osseointegrated implants used in prosthodontic dentistry. Two recent cases in the United States, while not linked to dentistry *per se*, provide glaring examples of a situation that could develop in dentistry. The Piper Aircraft Company was forced into bankruptcy when liability suits proved financially ruinous, and in January 1992 the U.S. Food and Drug Administration (FDA) placed a moratorium on the use of silicon breast implants pending further investigation.

By a small stretch of the imagination, it is possible to visualize a similar situation developing in dentistry. Manufacturers of dental implants could be forced into bankruptcy through costly court settlements, and dentists could be prevented by government agencies from placing osseointegrated implants – even though regulatory approval has been obtained for these products.

Based on what I have seen, my colleagues are becoming reluctant to propose osseointegrated implants as an option when discussing treatment plans with patients. Through personal communication with colleagues, I discovered that problems occurred in earlier “implant cases,” and dentists don't want the aggravation of potential problems. This seems a shame, as it can only slow down clinical experience and research in what is clearly a very promising part of restorative dentistry.

The interfacing of man-made materials alongside human tissue will never be without problems, but I hope to see both an increase in the use of osseointegrated implants in dentistry, and their improvement, in the years to come.

*William D. Brymer, DDS  
West Vancouver, B.C.*

## Did You Know? What's a billion !

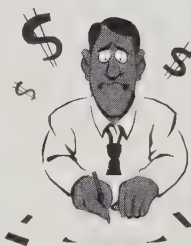
When the Honorable Donald Mazankowski, minister of finance, released the results of the government's financial operations for the first month of the 1991-92 fiscal year, the deficit was \$2.532 billion **more** than the year before.

For April 1991, budgetary revenues were \$7.665 billion and expenditures were \$12.460 billion, leaving a deficit of \$4.795 billion. For the same period in 1990 the deficit was only \$2.263 billion.

During a 1945 parliamentary debate, the Honorable C.D. Howe raised many a Canadian eyebrow with his query, “What's a million dollars?” Today we casually talk in billions.

But how much is a billion dollars? If you took your billion dollars and counted, “one dollar, two dollars, three dollars...”, one digit per second, 24 hours a day, 365 days a year non-stop it would take 31.7 years to total up your nest egg.

At that rate it would take the world's richest man, Japanese tycoon, Taikichiro Mori, 475.5 years to count his \$15 billion. **Good luck!**





Melanie is asthmatic, one of the growing population affected by this increasingly prevalent and severe condition.<sup>1</sup>

Does she know what analgesic is appropriate for self-medication if she needs one?

Living with the fear of an asthma attack is unpleasant enough without the potential risk of inadvertent salicylate or other NSAID induced asthma.

There are many brands of ASA and ibuprofen sold under different names over the counter and, unless you warn her, she may not know that acetaminophen is the appropriate choice to avoid inadvertent triggering of an asthma attack.

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It actually tells your patients when it's time to be replaced (of course, this will vary depending on personal brushing habits and techniques).

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Now for the first time ever, there's a toothbrush that actually helps patients act on your recommendations.

Oral-B INDICATOR™ toothbrush.





# Infection Control

## Addressing the Fears of HIV Transmission in Dental Practice

J. Hardie, BDS, M.Sc., FRCDC

### Introduction

A previous article, published in this journal,<sup>1</sup> demonstrated that a majority of Canadian dental health care workers would treat patients infected with the human immunodeficiency virus (HIV) or having the acquired immunodeficiency syndrome (AIDS). Nevertheless, they had concerns regarding the virus, the syndrome and the recommended infection control procedures. It was suggested that the identification and discussion of these reservations might allay some of the anxieties associated with treating HIV+/AIDS patients, and some of the frustrations experienced in complying with current infection control standards. This article will address the concerns dental workers have expressed toward HIV positive individuals and AIDS patients. A subsequent paper will focus on their reservations over infection control procedures.

### Concerns

According to a recent study,<sup>1</sup> the concerns of Canadian dental personnel regarding the treatment of HIV+/AIDS patients focus on:

- a) Personal safety
- b) Unknown routes of transmission
- c) Infection control techniques
- d) Stigma associated with AIDS
- e) HIV status of patients
- f) Staff resistance

### Discussion

#### a) Personal Safety

There are two separate but related aspects governing this concern. The first is general apprehension that HIV may be transferred from patient to dental care worker during the close contact that is necessary for most dental procedures. The second is the fear of transmission via a needlestick or similar injury. The first concern may be allayed by the following information.

**i) Exposure Versus Infection:** It is not surprising that dental personnel be-

lieve their working environment is hazardous to their health when a number of advertisements for infection control products appear to suggest a direct relationship between exposure to a microorganism and infection from it. It is true that everyday life exposes us to a magnitude of potential pathogens, but fortunately such exposure seldom results in infection. It must be emphasized that the simple presence of a potentially pathogenic bacterium, fungus or virus does not automatically guarantee infection by it. In fact, definite criteria must be satisfied by a microorganism before it is capable of causing an infectious disease.

**ii) Six Criteria for Disease Transmission:** An understanding of how microorganisms grow, multiply and cause disease is essential to placing concern over possible infection in proper perspective. Six essential factors must be present before infectious diseases can be transmitted:

**Sufficient Dose of an Infectious Agent:** The potential pathogen must be present in an amount sufficient to constitute an infectious dose. (For example, simply wiping an instrument may reduce, by friction, the mass of the infectious agent to a level that no longer constitutes an infectious amount.)

**Existence of Viable Infectious Agents:** In general, most microbes require very specific temperature, moisture, and light conditions, as well as suitable nutrients and pH levels, to sustain their growth. Fortunately, such conditions are not readily available outside of the human body or the bodies of the animals in which most human pathogens reside. Therefore, it is unlikely that microbes in the environment will be viable enough to cause disease. (For example, continued growth of HIV recovered from environmental surfaces, is only possible when the virus is cultured in a laboratory under optimal conditions.)

**A Mode of Escape:** Before initiating infection in secondary or subsequent hosts, the causative agent of a transmissible infection must escape from the

primary host. Possible portals of exit include the skin, ulcers and abrasions, blood, saliva, aerosols and feces. (Isolation and quarantine measures, for example, are an attempt to prevent escaping pathogens from infecting other hosts.)

**A Mode of Transmission:** After escaping from the primary host, the infectious agent must travel to the secondary host. The four principal methods of disease transmission are by physical contact with an infected person, through the air, through food and water, and by indirect contact via vectors (mosquitoes) or other objects. (For example, blood spills from a hepatitis B carrier are only dangerous if this blood comes into contact with a potential secondary host.)

**A Portal of Entry:** Before an infection can be transmitted, the causative agent must enter into the secondary host. Common portals of entry are via breaks in the skin and in the mucous membranes of the respiratory, gastrointestinal and urogenital systems. (The major function of gloves, masks and eye glasses, now an integral part of infection control procedures, is to deny causative agents access to potential portals of entry.)

**A Susceptible Host:** An infectious agent, having invaded a secondary host, will only cause disease if the new host is susceptible to the microbe. (For example, the hepatitis B virus will not cause disease in an individual who is non-susceptible by virtue of having had a hepatitis B vaccination.)

Every potentially infectious pathogen must overcome each of these obstacles before it can cause disease. The six criteria are not readily accomplished by most microbes, including HIV. While this does not imply that current concerns regarding transmissible diseases should be cast aside, it indicates that they should be tempered by knowledge and understanding rather than by ignorance and hysteria. This is particularly true with regards to HIV, where considerable publicity has created myths, paranoia and misinformation. As a re-



sult, HIV has had a tendency to be perceived as a "super" virus with extraordinary attributes. In reality, to be an infectious agent it must adhere to the six criteria outlined above.

### iii) The Experience of Care Givers:

HIV was identified relatively recently. Some health care personnel are understandably reluctant to accept the fact that the virus conforms to the established rules of disease transmission. Not surprisingly, this group is afraid of contracting HIV through close personal contact with an infected patient, or from insect vectors, environmental sources (aerosols) and inanimate objects (toilets, pens, and water fountains). These fears can sometimes be dispelled by informing the concerned personnel about the experiences of people who care for HIV infected/AIDS patients in institutions or family homes.

Extensive studies in North America and worldwide have found that HIV is not transmitted via casual contact in the home or workplace. This is true even if an uninfected individual and an AIDS patient share such items as drinking glasses, eating utensils, plates, sheets, or toilet and bathing facilities soiled by HIV blood or blood products, or indulge in such social interactions as sleeping together, hugging or kissing.<sup>2,3</sup> Furthermore, there is no evidence to suggest that HIV can be contracted through contact with inanimate objects such as typewriters, computers, telephones, pens or paper,<sup>2,3</sup> or that the virus can be spread by aerosols or insect vectors.<sup>2,3</sup>

Similarly, in the dental setting there is little or no danger of a care giver contracting HIV through personal contact with an HIV-positive individual, or through contact with environmental surfaces such as countertops, walls, floors, and light switches, or with the aerosols generated during dental treatment. This would apply even if no infection control precautions were taken.

Unfortunately, this general reassurance does not address another very real concern expressed by dental personnel, namely being infected by HIV as the result of a needlestick or similar invasive injury. This is a valid fear. One accepted route of HIV transmission is the percutaneous transfer of HIV-infected blood, in which the breach in the skin of the susceptible host creates a portal of entry for a pathogenic amount of the viable virus. (The other two accepted routes of HIV transmission are via sexual intercourse and perinatally from infected mother to child.) Before discussing the relevance of needlestick

injuries, however, it is pertinent to report, in general, on the history of HIV transmission to health care workers.

To date, approximately 30 health care workers (HCWs) worldwide have been reported as HIV positive subsequent to an occupational exposure to HIV.<sup>4</sup> Most of these accidents involved exposure to large quantities of HIV-positive blood via injuries from sharp instruments. Based on such reports, the Centers for Disease Control (CDC) have estimated that the risk of HIV transmission to an HCW due to a single occupational exposure to HIV-infected blood is, on average, 0.3 per cent or one in 333.<sup>4</sup> (For comparison, under similar circumstances, the risk of an HCW acquiring a hepatitis B infection is 30 per cent or one in three.) A recent Canadian study has suggested that the risk of acquiring an HIV infection subsequent to a needlestick injury is 0.5 per cent or one in 200.<sup>5</sup> In contrast, a prospective surveillance survey conducted since 1985 by the Federal Centre for AIDS has failed to report that any Canadian HCW occupationally exposed to HIV-positive blood has become infected with HIV.<sup>6</sup> To date, this ongoing investigation has involved 237 needlestick injuries, 22 scalpel wounds and 44 open wound contaminations.<sup>6</sup> It is significant that none of these percutaneous routes of transmission have resulted in HIV infection.

The above facts are based on at least 10 years of experience with HIV. The realization that only 30 HCWs worldwide may have contracted an HIV infection via their occupation during this period – when millions of health care procedures were performed, usually with minimal precautions and probably with a substantial number of needlestick-type injuries – is valid proof that HIV is not readily transmitted in the health care setting.

If HIV is to be transmitted to dental personnel, it appears that the most likely route of transmission is via exposure to sharp instruments, particularly needles – the so called needlestick injury. Needlestick injuries do occur in dentistry,<sup>4</sup> especially when hypodermic syringes are being handled by staff, and just prior to and immediately after the injection of local anesthetic into the oral tissues. There are, however, no prospective studies of the frequency of such percutaneous injuries among dental workers, the percentage of these injuries that expose dental personnel to HIV-positive blood, or the rate at which such an exposure results in HIV infection. In view of the worldwide experi-

ence among HCWs, it could be extrapolated that such injuries never or very rarely transmit HIV to dental staff. One reason for this is that the amount of blood on a used dental hypodermic syringe is extremely small. This amount is reduced by friction as the needle is withdrawn from the oral mucosa and further reduced by friction as it penetrates the rubber glove and superficial layers of skin. Therefore, it is entirely possible that the amount of blood eventually deposited subcutaneously in the dental host is insufficient to contain a pathogenic dose of HIV. This may be one explanation of why the 237 needlestick injuries<sup>6</sup> suffered by Canadian health care workers have failed to induce an HIV infection. In addition, local anesthetic solution may have a deleterious effect on the viability of HIV, thus reducing its pathogenicity.

These comments, combined with the fact that all dental personnel with AIDS have acquired the infection by lifestyle activities and not occupationally (apart from one questionable case in Klein's study<sup>7</sup>) provide strong epidemiological, historical and clinical evidence that HIV is not readily transmitted from patient to dental personnel during dental treatment or following needlestick or similar injuries. However, since prevention is better than cure, it is suggested that the safe and proper handling of surgical and sharp instruments will reduce the risk of a percutaneous route of transmission to zero.

### b) Unknown Routes of Transmission:

A frequent concern expressed by the respondents of a recent survey<sup>1</sup> was, "HIV is a new disease, all is not known about it and I am worried that it may be transmitted by some, as yet, unknown method." The legitimacy of this fear may be judged by analyzing some statistics pertinent to the AIDS experience in Canada. As of March 31, 1991, a total of 4,483 adult males were recorded as having AIDS in Canada. The figure for adult females was 242. Among these AIDS patients, the following risk factors were present: 78.8 per cent were homosexual/bisexual, 12 per cent were intravenous drug abusers, 3.4 per cent were both homosexual/bisexual and IV drug abusers, 4.7 per cent were exposed to HIV contaminated blood products for surgical procedures such as blood transfusions, 4.3 per cent had heterosexual activity in countries with a high rate of heterosexual HIV transmission, 3.4 per cent had heterosexual activity with a person at risk and 4.3 per cent



had no identified risk factors. (The "no identified risk factors" classification does not imply that individuals in this group contracted HIV through unknown routes of transmission, but that either the route of transmission has not been reported or that the patient has not – as yet – admitted to a specific lifestyle activity.)

The relevance of these statistics is that they demonstrate a remarkable similarity to all previous statistical analyses offered by the Federal Centre for AIDS. This suggests that during a decade of AIDS there has been a definite consistency among the groups at risk for acquiring HIV infection. If as yet unknown routes of transmission did exist, this consistency would not be present. Therefore there would appear to be sufficient historical statistical evidence to discount the fear that unrealized routes of HIV transmission may occur.

**c) Infection Control Techniques:** The concerns relating to this subject will be dealt with in a subsequent article.

**d) Stigma Associated with AIDS:** There is a perception among health care professionals – particularly dentists<sup>1</sup> – that a public acknowledgement of their willingness to treat AIDS patient can lead to a loss of non-HIV infected patients. It is important to assess the validity of this belief.

A 1988 study<sup>8</sup> of approximately 45 adults revealed that most had no concerns about contracting disease from their dentist or hygienist. Those who lived in San Francisco assumed that their dentist had treated an HIV+/AIDS patient, and were unconcerned provided proper infection control methods were adopted. However, some participants from Bakersfield, California (a town with a low incidence of HIV infection), said they would be uncomfortable attending a dentist who treated HIV+/AIDS patients, might seek another dentist and favored separate dental care facilities or rooms for patients with AIDS. A 1989 investigation<sup>9</sup> by the same authors<sup>8</sup> involved 2,000 adults in an America-wide telephone survey. This report<sup>9</sup> indicates that 63 per cent of respondents had thought about the possibility of contracting an HIV infection in the dental office, but even if they believed their dentist was treating an HIV-positive patient, 56 per cent would continue to attend the same dentist. The report does not indicate the opinion of the remaining 44 per cent, and it would be unfair to extrapolate that these indi-

viduals would change dentists. However, the two surveys do indicate that a significant percentage of the adult population in the United States fosters some reservations in regards to receiving treatment from dental personnel who care for HIV+/AIDS patients. Unfortunately, there are no Canadian surveys on this subject, and it is not known if the Canadian public has a similar fear. It does, however, appear to be a reasonable assumption that some discredit would accrue to a practice that publicly announced the treatment of HIV+/AIDS patients. Therefore, this fear of Canadian dentists would appear to have some legitimacy.

Having identified that this concern has some justification, it is important to indicate how it may be overcome. The general apprehension that many dental workers have toward HIV is probably present to a greater extent among the lay public. The well-informed dental staff has an opportunity to educate patients about HIV infection and AIDS, to demystify the disease and to discuss frankly its approach to HIV+/AIDS patients. A relaxed, knowledgeable and confident approach will do much to ease the concerns of a worried public. If this is not effective, patients who demand to be treated by dental staff who have not and will not treat HIV-positive patients may be informed – as a last resort – that such guarantees are impossible to give.

**e) HIV Status of Patients:** A number of dental workers expressed anxiety that new HIV+/AIDS patients do not always record this status on health questionnaires and that patients of record do not always indicate that their HIV status has changed from negative to positive.<sup>1</sup> There may be two concerns associated with this subject. The first is that dental staff may believe that such knowledge is essential for their personal safety. As has previously been discussed, the danger of HIV transmission is negligible and it may be reduced further by the safe handling of all sharp or surgical instruments as well as by adopting infection control protocols that are based on the nature of the treatment being given rather than the health status of the patient. The second concern stems from the perception that HIV-positive patients require special dental skills that are not present in the average general practice. While it is true that all practitioners should be familiar with the common oral signs and symptoms associated with HIV infection, Barr and his colleagues<sup>10</sup> have demonstrated

that HIV-positive individuals who are otherwise asymptomatic may be exposed to the same range of treatment modalities as non-HIV positive patients with no difference in dental prognosis or complications.

Inevitably, however, HIV-positive patients with definite symptoms of the infection or those with frank AIDS will have blood dyscrasia, immunological deficiencies and be on potent systemic medications. Under such circumstances, consultation with the patient's attending physician is recommended to mutually discuss the timing and nature of the most appropriate oral/dental treatment.

**f) Staff Resistance:** A common barrier to the treatment of HIV+/AIDS patients is "the resistance voiced by other staff members."<sup>1</sup> It is reasonable to assume that this resistance is based on some or all of the fears and anxieties previously discussed. As such, staff resistance will be overcome by sharing expertise and information, by attending recognized continuing education courses, by reading reputable articles and by asking questions of knowledgeable persons.

## Summary

Recent surveys indicate that dental personnel are prepared to provide care for HIV+/AIDS patients, but do so with some reluctance. Their specific concerns have been identified and an attempt has been made to allay these fears by examining them from scientific, clinical, epidemiologic and historical perspectives. These somewhat pragmatic criteria suggest that HIV transmission in dental practice is extremely unlikely – if not impossible. However, the explanations offered to arrive at these conclusions may fail to resolve the suspicions that some dentists and their auxiliaries harbor toward individuals demonstrating lifestyles foreign to their own. If this is so, the advice of counsellors, social scientists and behavioral modification experts must be sought if dental personnel wish to provide care to HIV+/AIDS patients in an atmosphere of mutual trust, confidence and respect.

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*Reprint Requests to Dr. Hardie.*

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### PRECAUTIONS AND TREATMENT OF OVERDOSE:

Resuscitation and supportive care must proceed as for any other potentially serious overdose. In acute overdose, serum levels of acetaminophen are meaningful in predicting those patients likely to develop serious hepatic toxicity. They must be drawn between 4 and 24 hours post overdose and the values plotted on the Matthew-Rumack Nomogram. N-acetylcysteine (N.A.C.) is a highly effective antidote for acetaminophen poisoning. Do not delay administration of N.A.C. either by parental or oral routes if the ingested dose is likely to be toxic ( $> 150\text{mg/kg}$  ingested) or if serum levels are in the toxic range on the Nomogram. N.A.C. must be administered prior to the 24th hour post overdose to be protective. Further details on therapy of acetaminophen overdose are available by calling your regional Poison Control Centre.

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†Package is child-resistant.

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# Specialty Feature

## The Preventive Resin Restoration: a Conservative Alternative

I. McConnachie, BS, DDS, M.Sc.

### ABSTRACT

*With the proven results of etched resin techniques, there has been renewed interest in conservative cavity design with a view to the preservation of healthy tooth material. Among the newer techniques showing long-term success are preventive resin restorations. This treatment has several distinct advantages over traditional amalgam restorations, but it requires excellent isolation from salivary and moisture contamination. Three types of preventive resin restorations, with high rates of retention over a seven-year period, have been described. Minimal exploratory openings in enamel are filled with pit and fissure sealants, whereas isolated carious lesions are removed without any extension into the surrounding healthy tooth. The cavity is obturated with filled resin and the unaffected pits and fissures are protected with pit and fissure sealant. The success rate of these conservative restorations can be enhanced by paying strict attention to technique, thereby ensuring a noncontaminated surface. A number of suggestions are offered on how this success rate can be increased.*

### SOMMAIRE

*Grâce aux résultats obtenus avec les techniques de mordantage appliquées à la résine, on s'intéresse de nouveau aux traitements conservateurs afin de pouvoir garder les parties dentaires qui sont saines. Parmi les nouvelles techniques dont le succès est durable, se trouvent les restaurations préventives à la résine. Cette technique a plusieurs avantages sur les restaurations traditionnelles à l'amalgame, mais les dents doivent être bien isolées de la salive et de toute humidité durant la restauration. Dans cet article, on décrit pour les restaurations préventives trois sortes de résine dont les taux de rétention sont restés élevés durant sept ans. La technique consiste à pratiquer dans l'émail de petites ouvertures exploratoires qu'on remplit de résine de scellement pour puits et fissures et à extraire les parties cariées*

*isolées sans toucher les parties saines qui sont autour. On obture ensuite la cavité avec de la résine. Les puits et les fissures intacts sont protégés par la résine de scellement. Le succès de cette technique est d'autant plus grand qu'on y accorde une attention plus stricte pour ne pas contaminer les surfaces. Aussi offre-t-on des conseils pour augmenter les chances de succès.*

The traditional theory of cavity design, which originated with G.V. Black, says that the outline form should be extended to prevent the recurrence of decay.<sup>1</sup> In the case of carious lesions on the occlusal surface of molars and premolars, this has meant extension into healthy pits and fissures.

More recent efforts in the prevention of occlusal caries have included the use of pit and fissure sealants. The long-term results achieved with this technique have reaffirmed the efficacy of the sealants.<sup>2,5</sup> In fact, the increasing success of etched resin restorative techniques and materials, combined with a lower caries rate and the desire to conserve as much healthy tooth material as possible, has led to a renewed consideration of "extension for prevention."

### Review of the Literature

Simonsen and Stallard first reported on a new restorative procedure in 1977. Isolated carious lesions within pits and fissures were removed and restored with composite resin, while the remaining, healthy fissures were sealed with a pit and fissure sealant.<sup>6</sup> Subsequent studies have refined the technique, now known as preventive resin restoration (PRR), and have confirmed the durability of this conservative restoration.<sup>7,14</sup> Hicks outlines three criteria for the placement of a preventive resin restoration:

- a) an explorer catch in an otherwise intact occlusal surface;
- b) deep pits and fissures which either prohibit complete penetration of the sealant or may possibly be carious at their bases;

- c) an opaque, chalky appearance along the pits and fissures, suggestive of incipient pit and fissure caries.<sup>15</sup>

Radiographs may confirm the presence of occlusal caries.<sup>16</sup> The absence of radiographic evidence is not always indicative of an absence of occlusal caries, however.

Preventive resin restorations are contraindicated in cases of deep or extensive occlusal caries, pulpal involvement or proximal caries.<sup>8,11,15</sup> Some dentists are reluctant to use sealants, partly because of a concern that caries will be inadvertently sealed in. But there is good evidence to suggest that this concern is unfounded. Studies have shown that where the sealant remains intact, the carious lesion becomes inactive with a marked decrease in the number of viable organisms under the sealant, or even their elimination.<sup>16,17</sup> This result depends on the sealant being intact, with the absence of marginal leakage. The removal of caries and placement of a preventive resin restoration ensures this conclusion.

### Advantages and Disadvantages

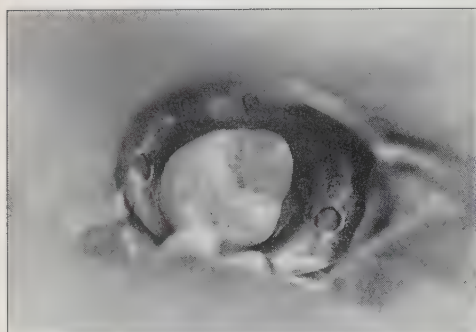
The preventive resin restoration has several advantages over the traditional amalgam restoration. For example, the repair of small occlusal lesions with amalgam requires the removal of substantial healthy tooth material, thereby weakening the tooth, especially when this is done at an early age. In one study, amalgam restoration with "extension for prevention" resulted in the removal, on average, of 25 per cent of the occlusal surface. Only five per cent, on average, of the occlusal surface was removed using preventive resin restoration.<sup>18</sup>

Recurrent caries can occur at the margins of amalgam restorations or in unprepared pits and fissures. Where microleakage does occur with preventive resin restorations, it is reported to be less than with amalgam.<sup>19</sup> In addition, the microleakage is at the sealant-enamel interface, and is therefore amenable to non-invasive repair with the early signs of breakdown.<sup>7,20,21</sup> The resin material is

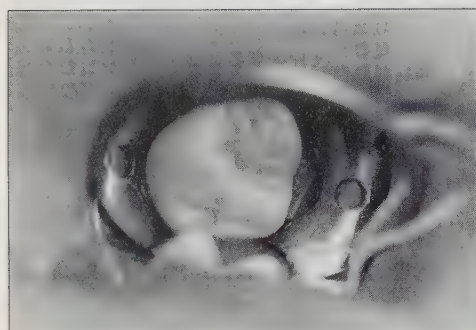




*Fig. 1: Molar with isolated fissure caries in enamel.*



*Fig. 2: Caries removal with round bur.*

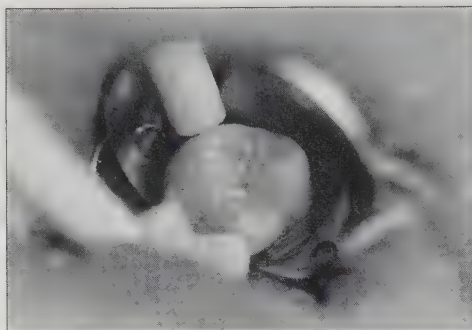


*Fig. 3: Molar etched prior to sealant.*

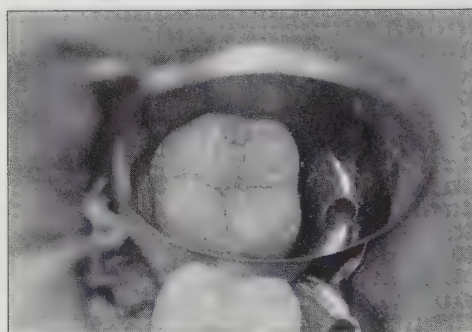
also vastly superior esthetically. And as there is less removal of tooth material, resin restorations can frequently be done without anesthesia, with minimal discomfort.

Current patient concerns over the mercury content of amalgam and its perceived health hazards can be allayed by the use of preventive resin restorations. This is not to say, however, that there won't be health concerns over the materials used in these resins at some time in the future.

Preventive resin restorations do have a few disadvantages. Foremost among them is the absolute need for moisture control. Unlike amalgam restorations, where minor moisture contamination does not unduly reduce the success of the restoration, the preventive resin restoration requires the clinician to pay strict attention to the principles of acid-etch technique.<sup>15</sup> Furthermore, whereas the amalgam has corrosion products that aid in marginal adaptation, there is no



*Fig. 4: Sealant placed in preparation and pits and fissures.*



*Fig. 5: Molar with several isolated carious fissures*

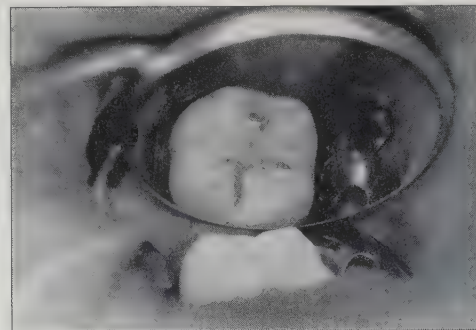
mechanism inherent in the resin to act as a counterbalance if microleakage does occur.<sup>22</sup> Finally, long-term data on both wear and retention beyond seven years are not yet available.<sup>9,11</sup>

### Clinical Procedure

Simonsen has outlined three types of preventive resin restorations, ranging from removal of minimal caries in enamel to preparations extending into dentin. Each type involves the placement of filled resin to replace a carious lesion and the use of sealant to protect unaffected pits and fissures.<sup>7,8</sup>

The sensitivity of preventive resin restorations to moisture contamination suggests that rubber dam isolation is strongly advisable, although many of the reports cited utilize only cotton isolation. Where rubber dam isolation does become necessary is with the partially-erupted tooth. The use of local anesthesia is dependent on the depth of penetration of the caries and the individual needs of the patient.

Most studies utilize rubber cup or brush prophylaxis with a slurry of pumice. An air slurry polisher is an excellent alternative. Christensen suggests the need, with the air slurry polisher, to neutralize sodium bicarbonate debris with a drop of liquid 37 per cent phosphoric acid for about five seconds, and then rinsing prior to initiating normal etching procedures.<sup>14</sup> On the other hand, it has been proposed that prophylaxis is of no benefit



*Fig. 6: Caries removed.*

to sealant retention.<sup>23</sup> This view is not widely held.

Early reports on the preventive resin restoration recommend a 60-second etching time.<sup>8,11,24</sup> More recent studies suggest that a shorter etching time is sufficient, with the range of recommended times extending from 15 to 40 seconds for permanent dentition.<sup>13,14,20,25,26</sup> Eidelman et al show no reduction in the retention of sealants with a 20 second versus a 60 second etch.<sup>25</sup> Primary dentition etch can also effectively be reduced to approximately double the time for permanent dentition. This time difference is due to the surface enamel formation.

Similarly, it is now believed that a protective base, lining the dentin, is needed prior to resin placement. Early studies advocate the placement of a calcium hydroxide base over the dentin prior to restoration, with glass ionomer having replaced calcium hydroxide as the base of choice in later research.<sup>14,20,27</sup> The advantages of the latter material include improved adhesion to both dentin and resin, improved strength, and fluoride content. It is anticipated that fluoride offers the potential for reduced development of secondary caries.<sup>14,27</sup>

Where concern is expressed about the wear characteristics of posterior resins, current studies on preventive resin restorations show that this is not a problem when the filled resin occupies such a small area and is minimally affected by occlusal forces.<sup>9,11,22</sup>

The research on preventive resin restorations has used permanent dentition exclusively. Reports on the use of composite resin in the restoration of primary molars show retention rates comparable to those of permanent dentition.<sup>28,29</sup> Similar results exist for the use of pit and fissure sealants. This suggests that preventive resin restorations have a place in the treatment of isolated occlusal carious lesions in the primary dentition. They have the added advantage of being minimally invasive, and therefore more readily accepted by the young pediatric pa-





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- A minimum preparation crown
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- Gross loss of tooth structure
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### *Porcelain-Fused-to-Metal Crown*

- When crown needs rigidity
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## CONTRAINDICATIONS

### *Dicor Plus Ceramic / Willi Glas Crown*

- White opaque teeth (i.e. shades A1 or B1)
- Where posts, metal or amalgam restorations must be covered
- Where there is little room for preparation and to work
- Where cementing is preferred

### *Mirage Ceramic Crown*

- Where extensive preparation is required
- Where dentin-bonding is not desired
- Where parafunctional (bruxism, clenching) activity present

### *Ivoclar Empress Crown*

- If little tooth structure remains

### *In-Ceram Crown*

- If colour is critical
- If bonding is desired
- Where there is little room for preparation and to work
- Where opaque layer is not desired

## RECOMMENDED AUXILIARY MATERIALS

### *For Preparation*

- Cerum FG Diamond Gold Gingival Crown Prep Kit
- Mirage Bur Kit
- Diamonds / Carbides to produce rounded internal angles
- Flexible Clearance Tabs (for direct intraoral measurements of occlusal tooth reduction)

### *For Impressions*

- Panasil vinyl polysiloxane impression material
- Full arch plastic disposable trays / tray adhesive

### *For Bonding*

- Mirage Bond Dentin / Enamel Bonding Agent and Mirage Fluoride Luting Composite (F.L.C.) Kit
- Mirage F.L.C. Tint & Opaque Kit
- Mirage Try-In Paste
- Porcemetric Light Cure and Dual Cure (a disposable alternative)
- Dicor Light Activated Cementation Kit
- IPS Empress Cem Kit

### *For Finishing*

- ET Finishing Kit (Brasseler)
- Clinician Finishing Kit 3895 (Den Mat)
- Shofu white polystones or finishing diamonds
- Discs and mandrels as for gold restorations
- Gingival diamond files (Lasco)
- Articulating ribbon and holders
- Profin reciprocating diamond tips

### *For Polishing*

- Cerum Dental Diamond Paste
- Truluster Porcelain Polishing System (Brasseler)
- Chameleon Diamond Paste

Dicor Plus Crown on 1.1 and 2.1



Dicor Plus Crown on 1.1 and 2.1



## YOUR TOTAL SOURCE



# Choosing Between Restorative Crown Options

The advent of new dental laboratory technologies and improvements in dental materials for crown foundations and for cementing has resulted in confusion as to appropriate crown selection. To assist in choosing the most effective option, some general principles of crown selection for esthetic restorations have been defined:

1. How much natural tooth remains?
2. Are esthetics critical?
3. What is the condition of adjacent teeth?
4. What is the loading (bite pattern) situation?

Let's apply these rules with an example single unit anterior in a step-by-step selection process (for an anterior crown):

## 1. How much of the natural tooth remains?

- If the tooth to be restored has a great deal of intact tooth structure remaining and only requires slight or partial reduction, a MIRAGE crown can be used (IMPORTANT: ensure that appropriate composite foundation / reinforcement is

accomplished so the crown is no thicker than 1.25 mm)

- If the tooth to be restored has lost a lot of tooth structure (i.e. large restorations on either side or labially) (older person with multiple restorations), a full coverage / full preparation crown (WILLI GLAS, IN-CERAM, DICOR PLUS or PFM) should be selected

## 2. Are esthetics critical?

- If colour / esthetics are critical, select DICOR PLUS or WILLI GLAS. With resin bonding techniques, manipulation of the cementing material can adjust crown shade by 1/2 shade either way, or increase or decrease brightness
- In situations with severely discoloured teeth or post-cores, IN-CERAM's opaque layer makes a good compromise between masking and esthetics

## 3. What is the condition of adjacent teeth?

- If colour is less critical and when tooth or teeth to be restored are positioned adjacent to existing

PFM crowns or between PFM and an intact natural tooth, select IN-CERAM

- If angulation of adjacent teeth does not allow a precise line of insertion, a PFM crown (which can be inserted under pressure) may be needed

## 4. What is the loading (bite pattern) situation?

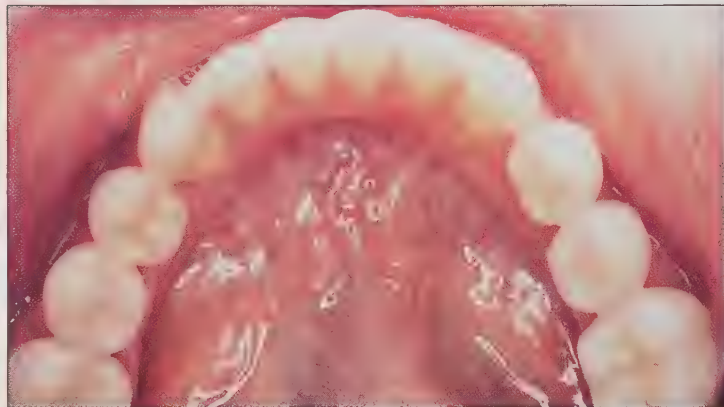
- In cases where there is heavy occlusal wear, deep overbite or tooth has been subjected to a lot of flexure (i.e. notched cervical erosion on neck) where the crown needs rigidity — use PFM crowns
- When metal lingual or occlusal stops are required, the use of metal allows a much thinner restoration (i.e. .5 mm) in specific areas such as the upper anterior palatal surfaces

For lower anterior teeth, either MIRAGE or IN-CERAM are the restorations of choice due to small teeth with little residual tooth structure.

Upper - Finished Mirage cuspid back to 2nd molar



Maxillary centrals In-Ceram (Note the absence of gingival greying)



◀ Lower - Finished Mirage cuspid back to 2nd molar

## YOUR TOTAL SOURCE



# Inlays / Onlays / Overlays

Today's patients are demanding cleaner, brighter and more perfect teeth while still preserving natural tooth structure. This demand has influenced our restorative choices not only in the anterior but also in the posterior region (Class I or II; Inlays, Onlays, Overlays; Amalgam restoration replacement). Aurum Ceramic / Classic offers proven solutions, in either porcelain or resin, to all of your Inlay, Onlay or Overlay needs.

## INDICATIONS:

### Porcelain

- Relatively intact tooth
- Younger, caries free person
- Gingival margin on enamel (i.e. adequate amount of well-supported enamel)
- No parafunction or treated occlusal disorder
- Cuspid protected occlusion
- No anticipated pulpal involvement
- Teeth opposed by porcelain Occlusal surfaces

### Dicor

- Where preparation without bevels (i.e. a box preparation) can be accomplished

### Resin (Brilliant, Concept, Conquest, Kulzer)

- Where parafunctional (bruxism, clenching) activity is present
- Teeth which are opposed by resin restorations
- In situations where ease of try-in and cementation is important (i.e. resin is not fragile like porcelain) (preparation less critical as materials are more forgiving)

## CONTRAINDICATIONS:

### Porcelain

- Where parafunctional activity (bruxism, clenching) is present
- In situations with occlusal disorder

### Dicor

- In cases without adequate room for minimum 1 mm preparation

### Resin (Brilliant, Concept, Isosit, Kulzer)

- Where colour stability is essential
- Teeth opposed by porcelain occlusal surfaces

## RECOMMENDED AUXILIARY MATERIALS:

### For Preparation

- Cerum FG Diamond Gold Gingival Crown Prep Kit
- Mirage Bur Kit

### For Impressions

- Panasil vinyl polysiloxane impression material
- Full arch plastic disposable trays

### For Bonding

- Mirage Dual Cure
- Mirage Bond Dentin / Enamel Adhesive and Mirage Fluoride Luting Composite (F.L.C.) Kit
- Mirage F.L.C. Tint & Opaque Kit
- Mirage Try-In Paste
- Porcemetric Light Cure and Dual Cure (a disposable alternative)

### For Finishing

- ET Finishing Kit (Brasseler)
- Clinician Finishing Kit 3895 (Den Mat)
- Shofu white polystones or finishing diamonds
- Discs and mandrels as for gold restorations
- Gingival diamond files (Lasco)
- Articulating ribbon and holders

### For Polishing

- Cerum Dental Diamond Paste
- Truluster Porcelain Polishing System (Brasseler)
- Chameleon Diamond Paste

Before inlay restoration



Amalgams replaced with occlusal inlay in second molar and DO in first molar.



## YOUR TOTAL SOURCE



# Choosing Between Porcelain, Dicor and Resin Inlays / Onlays

## Select Porcelain Inlays / Onlays when:

- Where colour stability is essential
- Relatively intact tooth
- Younger caries free person
- Gingival margin on enamel (adequate amount of well-supported enamel)
- No parafunction or treated occlusal disorder
- Cuspid protected occlusion
- No anticipated pulpal involvement
- Teeth opposed by porcelain occlusal surfaces

## Select Dicor Inlays / Onlays when:

- Colour stability is essential
- A preparation without bevels (i.e. a box preparation) is desired and can be accomplished
- A minimum 1 mm preparation can be accomplished

## Select Resin Inlays / Onlays when:

- Parafunctional (bruxism, clenching) activity is present
- Teeth are opposed by resin restorations
- In situations where ease of try-in and cementation is important (i.e. resin more forgiving than porcelain and preparation is less critical)

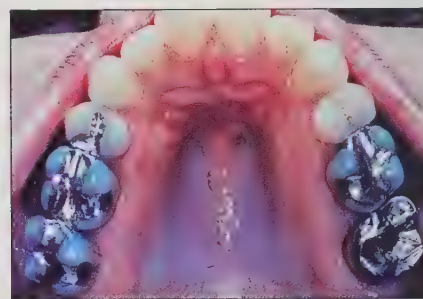
## Placing A Proper Foundation

The successful replacement of large amalgams with bonded porcelain inlays or onlays requires removal of all the old alloy and the placement of a high compressive strength foundation material. The importance of a firm foundation is best illustrated by the analogy of ceramic floor tiles. When placed on an old wooden floor that flexes, these tiles crack and break. The same situation

will exist if an inlay or onlay is placed over a non-rigid base. Two alternative methods are available:

1. A dentin agent (Mirage Bond or All-Bond) and a composite foundation. Composite materials may be dual cure or chemical cure (self cure) and should be allowed to set completely.
2. Shofu Glas Ionomer Base Cement sets to nearly 30,000 psi. Pin reinforcement (Max Pins from Whaledent) will assist in resisting dislodgement. It should be noted that the light cured glass ionomer liners are only marginal in the provision of compressive strength.

Ensure that preparations allow for a maximum porcelain thickness of 1.5 mm especially in the marginal ridge area.



Old amalgams (above) replaced with new natural looking posterior resin restorations (left). Note anatomical contours and precise margins.

## YOUR TOTAL SOURCE



# In-Ceram All-Ceramic Bridges

## *The Esthetic Alternative to Porcelain-Fused-to-Metal!*

Combining unequaled esthetics with the wear-resistance of porcelain, In-Ceram offers three times the flexural strength of previous materials. The combination of a highly concentrated, ultra-fine alumina particle substructure encapsulated and connected by a thin layer of glass provides unprecedented flexural strength ratings in the 450-600 Mpa range — more than enough for 3 unit bridges as well as individual anterior and posterior crowns.

Covered with Vitadur-N porcelain, each In-Ceram restoration is layered and shaded from within as in natural dentition. The absence of a metal substructure allows light to be transmitted to the tooth roots, radiating from there into the gingival area and eliminating the "shadows" common to traditional restorations. And, In-Ceram's all-ceramic construction and superb marginal fit of 20-25 microns provides excellent gingival response, eliminating irritation and unsightly gum recession.

### INDICATIONS:

- Maximum 3-unit anterior restorative situation
- Where optimal esthetics, without metal shadows, are important
- Where decreased thermal conductivity is important

### CONTRAINDICATIONS:

- No room in occlusion
- Unable to reduce tooth structure to allow 1.5 mm preparation
- Bruxism or parafunctional activity

### AUXILIARY MATERIALS:

#### For Preparation

- Cerum FG Diamond Gold Gingival Crown Prep Kit
- Mirage Bur Kit
- Flexible Clearance Tabs (for direct intraoral measurements of Occlusal and Interproximal tooth reduction)

#### For Impressions

- Panasil vinyl polysiloxane impression material
- Full arch plastic disposable trays

#### For Cementing

- Glas ionomer cement
- Mirage Bond Dentin / Enamel Adhesive and Mirage Fluoride Luting Composite (F.L.C.) Kit
- Panavia (with New Bond or Photo Bond)

#### For Finishing

- ET Finishing Kit (Brasseler)
- Clinician Finishing Kit 3895 (Den Mat)
- Shofu white polystones or finishing diamonds
- Discs and mandrels as for gold restorations
- Gingival diamond files (Lasco)
- Articulating ribbon and holders

#### For Polishing

- Cerum Dental Diamond Paste
- Truluster Porcelain Polishing System (Brasseler)
- Chameleon Diamond Paste

*Clinical view of the three unit In-Ceram bridge 1.3-1.1*



### Preparation Guidelines

1.5 mm Wall Thickness



Facial Section

## YOUR TOTAL SOURCE



# Porcelain Veneers

## Create That Perfect Smile!

Now you can offer your patients unsurpassed esthetics and vitality in a strong, wear resistant anterior restoration. Less invasive and destructive than full coverage restorations. True colour fluorescence of bonded laminates responds to changing light conditions just like the natural dentition.

Today you can choose from two basic veneer preparation alternatives: the standard laminate requiring 0.5 mm of reduction (with bevelled or lapped incisal edge and proximal extension from labial to contact point) or, if you prefer more direct control over the esthetic result, Ultra-conservative Porcelain Veneers (UcPV's). Ultra-thin (4/10 mm) UcPV's preserve the maximum amount of the patient's natural tooth structure. This is particularly valuable in instances where small teeth are to be restored or where there is limited space.

At the same time, they allow the practitioner greater opportunity for in-office sub-veneer staining and characterization, in effect transferring some of the artistry back to the hands of the dentist. The use of colour adaptable bonding resins and flamed porcelain knife-edges on the restoration itself allow virtually invisible supragingival, gingival, proximal and interproximal margins.

### INDICATIONS

- Esthetic improvement of tetracycline stained teeth
- To correct malpositions of individual teeth
- Fluorosed or hypoplastic teeth
- Pulpal calcification or other discoloured teeth
- Fractured or chipped teeth

- Diastema closure
- Failure of vital bleaching or need for permanent alteration
- Esthetic contouring
- Incisal edge wear or fractured restoration
- Modifying or maintaining anterior guide angles (lingual anterior application)
- Canine rise restorations

### CONTRAINDICATIONS

- Grossly broken down or overly restored teeth
- Intensely stained endodontically treated teeth
- Teeth subject to bruxing or parafunctional activity
- Malpositioned teeth where a direct-access line of insertion cannot be secured
- Spaces or diastema where closure would result in a bell-shaped contour
- Teeth with defective enamel over the entire crown
- Teeth with insufficient coronal tooth structure (less than 1/2 of coronal tooth structure remains)
- Teeth which are still actively erupting
- Teeth exhibiting severe crowding
- Teeth exhibiting extreme occlusal trauma or wear

### RECOMMENDED AUXILIARY MATERIALS:

#### For Preparation:

- Cerum FG Diamond Gold Laminate Veneer System Kit
- Mirage Bur Kit
- Diamonds for controlled tooth reduction
- Flexible Clearance Tabs (for direct intraoral measurements of occlusal and interproximal tooth reduction)

#### For Impressions:

- Panasil vinyl polysiloxane impression material and plastic disposable trays

#### For Bonding:

- Mirage Bond Dentin / Enamel Adhesive and Mirage Fluoride Luting Composite (F.L.C. ) Kit
- Mirage F.L.C. Tint & Opaque Kit
- Mirage Try-In Paste
- Porcemetric Light Cure and Dual Cure (a disposable alternative)

#### For Finishing:

- Cerum FG Diamond Gold Laminate Veneer System Kit
- 30 fluted finishing diamonds
- 40 and 15 micron diamonds

#### For Polishing:

- Cerum Dental Diamond Paste
- Truluster Porcelain Polishing System
- Chameleon Diamond Paste
- Shofu Porcelain Laminate Finishing Kit
- Premier Two Stripper MPS diamond polishing system

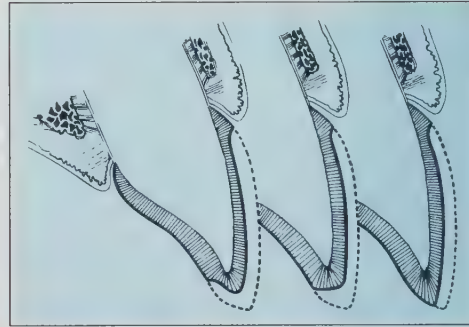
Before



After Ultra-conservative Porcelain Veneers



Incisal Margin Placement (Proximal View)



Victoria  
(604) 595-2314

Vancouver  
(604) 874-3451  
1-800-663-1721

Kelowna  
(604) 762-3022

Vernon  
(604) 542-5164  
1-800-663-5413

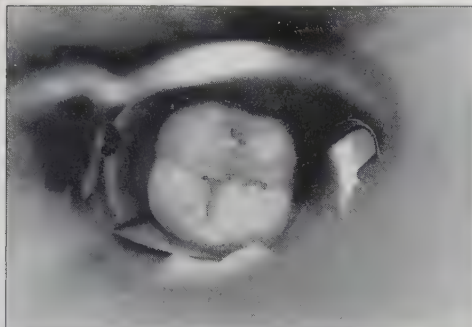
Calgary  
(403) 228-1904  
1-800-661-1169

Edmonton  
(403) 423-1904  
1-800-661-2745

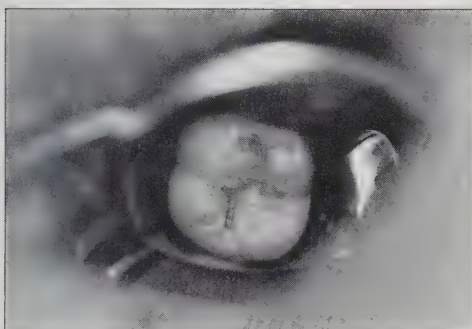
Saskatoon  
(306) 665-8815  
1-800-665-8815

Ottawa  
(613) 727-5230  
1-800-267-7040





**Fig. 7:** Glass ionomer placed, enamel etched.



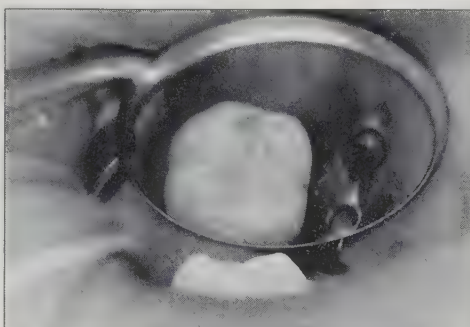
**Fig. 8:** Bond placed extending to adjacent fissures.

tient than occlusal amalgams, which have a concomitant need for local anesthesia. The selection of appropriate pediatric patients for primary molar treatment should take into consideration the susceptibility to subsequent interproximal caries.

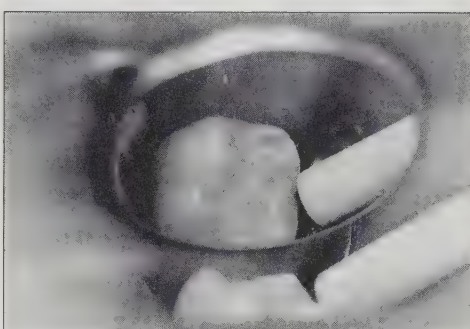
Concern has been voiced that compatible visible-light cure resin and sealant should be used in preventive resin restorations to allow for the simultaneous cure of the resin and sealant. This avoids the possibility of the sealant-filled resin interface being disrupted as a result of the sealant contracting during polymerization on top of a set composite surface. This warrants further investigation.<sup>18,24</sup>

### Type I PRR:

This type of preventive resin restoration is indicated when the clinician identifies a minimal lesion in enamel or is unsure whether a deep pit or fissure is caries free (Fig. 1). Following isolation and prophylaxis of the affected tooth, where caries are suspected or further investigation is warranted, a small exploratory preparation is made, usually with a small round bur in low or high speed (Fig. 2). Upon caries removal, if the preparation is still in enamel, the tooth is then etched (Fig. 3) as for a routine pit and fissure sealant and a sealant is applied (Fig. 9). Care must be taken to ensure that no air voids are incorporated in the sealant material.<sup>7</sup> Some authors prefer the use of pear-



**Fig. 9:** Filled resin placed.

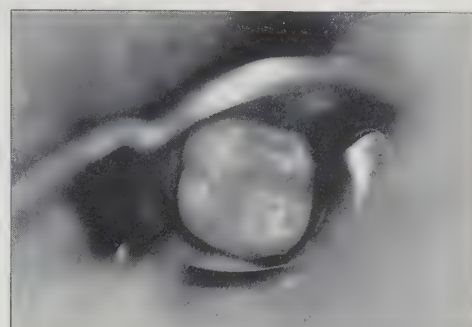


**Fig. 10:** Sealant placed over resin and healthy pits and fissures.

shaped burs or tapered diamond to remove the caries in the belief that this provides a superior surface for etching and better retention.<sup>11,24,30</sup> Opening the fissures appears to reduce the microleakage as compared to the placement of sealant without preparation.<sup>13</sup> However, where the width of the opening is greater than one millimetre in cross section, the placement of a type II PRR (see below) is likely preferable, in order to take advantage of the strength of a filled resin. Gerke reports on a modification of the technique, whereby a diamond bur is used for access. Following etch rinsing and drying, the bond is placed followed by a filled resin. The bond and filled resin are then overlaid onto the enamel surface, including unaffected fissures, after which the material is cured. There were no failures reported, although this was only at a six-month follow-up.<sup>31</sup>

### Type II PRR:

This restoration is indicated when the exploratory opening is greater than one mm in cross section or the decay has penetrated into the dentin, but only in isolated pit or fissure areas (Fig. 5). The depth of caries in the dentin should be no more than half of the distance to the pulp. Depending on the depth of the lesion(s), local anesthesia may be given. The tooth is well isolated, and prophylaxis is carried out with a slurry of pumice. The caries are accessed, usually with a round or pear-shaped bur in low or high speed.



**Fig. 11:** Completed preventive resin restoration.

The preparation consists only of the removal of the caries and all soft demineralized enamel (Fig. 6). Slightly undermined enamel is left intact as are stained but firm fissures.<sup>10</sup> Care must be taken to watch for intact fissures showing underlying discoloration, as these will often be areas of surprisingly significant caries. Furthermore, the clinician must assess intact grooves for the tracking of caries as well as the dentinoenamel junction for caries migration. Initial articles suggested placing a calcium hydroxide base over the dentin prior to acid etching. Currently, however, the placement of glass ionomer base over exposed dentin for pulp protection is preferred (Fig. 7). The enamel is then etched with 37 per cent phosphoric acid for 15-60 seconds, depending on the etching time chosen by the clinician. Bonding agent is placed in the cavity preparation and spread over the remaining adjacent etched pits and fissures to a thin layer (Fig. 8). A wear-resistant and radiopaque composite resin material is then placed in the preparation, with excess resin being extended into adjacent unprepared, but etched and bonded, fissures (Fig. 9). This is usually done with a plastic instrument or brush. Any other caries susceptible but non-adjacent pits and fissures are protected by conventional sealant material (Fig. 10). Following rubber dam removal, the occlusion is carefully checked and any interferences are removed with finishing burs.

### Type III PRR:

The indications for this restoration are the same as for the type II restoration. In addition, the preparation and pulp protection techniques used for the two restorations are identical. The placement of the bond and filled resin is restricted to the cavity preparation, with no attempt to extend this to adjacent pits and fissures. Following the placement of the filled resin in the cavity preparation, the adjacent fissures and other caries, susceptible pits and fissures, are covered by pit and



fissure sealant. Given that the indications for type II and type III preventive resin restorations are identical, a clear superiority of one technique over the other has yet to be determined.

## Clinical Tips

As these are very technique-sensitive procedures, there are a number of clinical tips that I have found useful in the successful delivery of these restorations:

**Rubber dam:** Adequate isolation is essential to the preventive resin restoration. Cotton roll isolation is insufficient in the majority of cases, especially for the active, young patient. This being the case, the clinician must decide whether to treat the partially erupted tooth or to defer treatment for a number of months. When electing to treat without rubber dam, gingival retraction cord may be of assistance where the distal gingiva approximates the distal fossa of the tooth. When rubber dam is placed but saliva continues to seep around the clamp, the placement of a supplemental saliva ejector under the rubber dam adjacent to the tooth will be helpful. If the patient is disinclined to accept the rubber dam due to difficulty in nasal breathing or swallowing, a small hole can be cut in the rubber dam to assist the patient. This will also facilitate the placement of the saliva ejector if needed.

**Evacuation:** High volume evacuation is a routine part of dentistry. Besides the removal of water and saliva from the area of the tooth, the high volume may result in the contamination of the occlusal surface of the tooth at a critical time by drawing the saliva from under the rubber dam around the clamp. The capillary action of the moisture will then result in the contamination of the occlusal surface. The clinician is advised to switch to a narrower diameter surgical suction tip from the point at which etch is placed on the tooth.

**Air voids:** It is preferable to use a syringe in placing the filled resin so as to reduce the likelihood of incorporating air bubbles in the resin. Similarly, air bubbles can be found in the sealant placed over the resin, depending on the system used. Following placement, surgical suction placed at the edge of the sealant will remove excess sealant as well as removing entrapped air bubbles.

**Choice of materials:** All clinicians have their special preferences with respect to materials, and many of the available materials have been favorably reported on. Given that complete retention of the preventive resin restoration is reported to be in the order of 60 to 70 per

cent over 6.5 to seven years,<sup>9,11</sup> and that the initiation of failure is at the sealant-enamel interface due to microleakage, there is some advantage in being able to visually inspect this interface, as well as under the sealant, for signs of discoloration. For this reason, a clear, translucent sealant material is superior to a tinted opaque material.

## Summary

The preventive resin restoration has been described by various authors over the last 14 years. Sufficient long-term data are now available to confirm it as a predictable conservative restoration. With the diminishing incidence of interproximal caries, continuing improvements in resin materials, and the resolution of some of the unknowns with respect to optimal technique, the preventive resin restoration should become a standard procedure among clinicians.

*Dr. McConnachie is a staff pediatric dentist at the Children's Hospital of Eastern Ontario. He also maintains a private practice in Nepean, Ontario.*

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# Specialty Feature

## Dental Care for the Pediatric Cardiac Patient

*J. Mervyn Creighton, B.Sc., DDS, Dip. (Pedo.), MRCD(C)*

### Congenital Heart Disease

The two cardiovascular diseases seen most often in childhood are congenital heart disease and rheumatic fever. The incidence of cardiac pathosis is approximately six cases per 1,000 live births.<sup>1</sup>

Dental patients with congenital heart disease rarely betray their condition during the orofacial examination. Although dentists should be aware of the external physical characteristics that may suggest an underlying cardiac abnormality – such as Down's facies or elfin facies – the typical ambulatory patient with congenital cardiac impairment often displays little physical evidence of such derangement. The blue mucosa and integument of central cyanosis, so characteristic of right-to-left shunting lesions, is most often observed in those too young and infirm to have come under a dentist's care. When some clinically detectable hypoxemia does persist on a chronic basis, a change in the depth of cyanosis should always be sought by the dentist as evidence of hypoxic decompensation.

Anomalies of the dentition may bring children with cyanotic disease under the dentist's care, however, requiring each consultant to be aware of the frequent association between hypoplasia of the primary dentition and cyanotic heart disease. Delay in the formation of the permanent teeth has also been demonstrated in this group. Other reported oral findings such as furrowed tongue in tetralogy of Fallot and enlargement of maxillary incisor pulp chambers in coarctation of the aorta are too variable and nonspecific to be used in the clinical detection of disease.

Because the upper extremities are easily accessible to the dentist, they should always be examined for clubbing of the fingers.

The dentist's primary concern in treating patients with congenital heart disease is the prevention of bacterial endocarditis, the elimination of dental and periodontal disease and the main-

tenance of good oral hygiene. Dental and periodontal infection should always be diagnosed and treated before heart surgery to minimize the risk of postoperative infection.

In contrast to the child with a congenital heart defect, the child who has had rheumatic fever or acquired heart disease with resultant damage to the heart valves must always be treated prophylactically against bacterial endocarditis. Any defect in the cardiac system that produces turbulent blood flow increases the chances of bacterial endocarditis.

### Dental Treatment

Before providing a dental procedure to a child with heart disease, the dentist should obtain a thorough medical history. In addition, he or she should consult the child's pediatrician, family physician or, preferably, cardiologist. The consultation should provide information on the precise nature of the defect, the child's ability to tolerate stress or anxiety, current medications and any specific recommendations for patient management.

The dentist's primary concern in treating children with heart disease is the prevention of bacterial endocarditis, the elimination of dental disease, and the maintenance of good oral hygiene. Cardiac patients are often overprotected and overindulged by parents concerned about the child's long-term prognosis. As a result, they frequently have poor dietary and oral hygiene habits. It is not unusual to find caries at an early age.

Although it is an uncommon disease, post-dental infective endocarditis, despite advances in antimicrobial therapy, continues to be a significant source of morbidity and mortality. Prevention, where possible, is therefore very worthwhile.

Between 25 and 40 per cent of patients with endocarditis have a history of recent dental manipulation.<sup>2</sup> Antibiotic prophylaxis has been the primary therapeutic strategy employed to prevent the occurrence of infective endo-

carditis. Dentists must identify patients at risk for contacting infective endocarditis and take suitable precautions to prevent a bacteremia during therapy.

The American Heart Association has issued a series of recommended regimens for the prevention of bacterial endocarditis. These include:

1. Standard regime for patients at risk, including those with prosthetic heart valves – amoxicillin, three grams orally one hour preoperatively; 1.5 g six hours after the initial dose. Penicillin V can be considered as an alternative drug, but of second choice.

2. For patients allergic to amoxicillin/penicillin – erythromycin ethyl succinate, 800 mg orally two hours preoperatively; 400 mg orally six hours after the initial dose, or; erythromycin stearate, one gram orally two hours preoperatively; 500 mg orally six hours after the initial dose, or; clindamycin, 300 mg orally one hour preoperatively; 150 mg orally six hours after the initial dose.

3. For patients who do not have enough time to take oral medications before treatment or cannot do so because of NPO requirements presurgically – ampicillin; two grams intravenously (IV) or intramuscularly (IM) 30 minutes preoperatively; one gram IV or IM six hours after the initial dose. Amoxicillin, 1.5 g orally, may be substituted as a follow-up dosage six hours after the initial dosage.

4. For patients allergic to amoxicillin/penicillin who do not have enough time to take oral medication before treatment or cannot do so because of NPO requirements presurgically – clindamycin, 300 mg IV 30 minutes preoperatively; 150 mg IV or orally six hours after the initial dosage.

5. For patients considered high risks and not candidates for the standard regime – ampicillin, gentamicin and amoxicillin. Ampicillin, two grams IV or IM plus gentamicin 1.5 mg/kg (not to exceed 80 mg total) 30 minutes preoperatively followed by amoxicillin 1.5 g orally six hours after initial dosage. Alternatively, the parenteral regime may be repeated eight hours after the initial



dosage.

6. For patients allergic to amoxicillin/penicillin V who are considered to be at extreme high risk and not candidates for the standard regime – vancomycin, one gram IV administered slowly over a one-hour period, starting one hour pre-operatively. No follow-up dosage is necessary.

7. Pediatric doses should not exceed the total adult dose. Initial dosage for the various antibiotics are: amoxicillin, 50 mg/kg; clindamycin, 10 mg/kg; erythromycin ethyl succinate, 20 mg/kg; erythromycin stearate, 20 mg/kg; vancomycin, 20 mg/kg; ampicillin, 50 mg/kg; gentamicin, two mg/kg. Follow-up doses should be one half the initial dosage.<sup>3</sup>

Fleming et al, studying the development of penicillin-resistant oral streptococci after repeated penicillin prophylaxis, concluded that multiple dental visits may be scheduled one week apart without altering the standard regime of the American Heart Association.<sup>4</sup>

Proposals for antibiotic regimens must be linked to providing better education and information to patients, parents, doctors and dentists. Furthermore, they should be in agreement with current recommendations to ensure that patients at risk for bacterial endocarditis receive the highest possible level of dental care.

In summary, dental treatment plans for patients with congenital heart disease must include the following:

1. Medical consultation to learn the specific nature of the defect, specific past history and risk of decompensation or arrhythmia.

2. Antibiotic prophylaxis for all dental procedures in an effort to avoid endocarditis and brain abscess.

3. Prompt and vigorous treatment of all oral infections, with extraction to be considered the preferred treatment for endodontically involved primary teeth.

4. A frank and open discussion with the parents and patient, detailing the importance of strict oral hygiene and regular dental care to the patient's oral and general health.<sup>5</sup>

### Pre-sweetened Liquid Medication and Caries Incidence

Feigal et al state that reports indicate pre-sweetened liquid medications may cause an increase in dental caries.<sup>6</sup> Winter et al correlated a high decay rate in 100 school children with the use of the comforter (pacifier) and the use of sweetened vitamin supplements.<sup>7</sup> Fei-

gal et al reported that the sugar contents of common pediatric medications are extremely high (30 to 70 per cent), and that oral rinses with these medications cause a decrease in dental plaque pH similar to the pH change following a sucrose rinse.<sup>8</sup> In an animal study, Greenwood et al showed significant increases in sulcal caries in rats orally rinsed three times a day with a high sucrose liquid medication.<sup>9</sup> Human plaque pH response to several groups of non-prescription medicinals was reported by Imfeld, with many medicinals causing significant pH decreases.<sup>10</sup>

In a clinical study of the relationship between caries and liquid medication intake, Roberts and Roberts found a greater incidence of dental caries and gingivitis in children taking medication than in the control population.<sup>11</sup> However, the multifactorial etiology of dental caries makes it difficult to derive cause and effect relationships from human studies. Young cardiac patients

may be expected to have lower caries rates because of a heightened health awareness on the part of the family, with a concomitant commitment to preventive medicine. On the other hand, young cardiac patients are often a protected and cuddled group, factors which may increase snack consumption and, therefore, caries. Definitive studies on these factors in young cardiac patients do not exist.

Feigal et al's study on the relationship between dental caries and liquid medication intake in young cardiac patients was not entirely definitive. They concluded that their data did not support the view that the caries rate for most children is markedly affected by chronic liquid medication intake, but that over a large study population, the effect on caries rate is significant. The fact that some children are affected by sucrose-containing medicines led them to continue to question the use of sucrose as a sweetening agent in pediatric

**Table I**

### The sugar (sucrose) content of some common oral antibiotics and cardiovascular medications

| Drug                                  |                           | Dose per 5ml | Sucrose per 5 mL |
|---------------------------------------|---------------------------|--------------|------------------|
| AMOXICILLIN                           | (Amoxil)                  | 125 mg       | 507.6 mg         |
|                                       |                           | 250 mg       | 407.6 mg         |
|                                       | (Novo)                    | 125 mg       | 2.93 g           |
|                                       |                           | 250 mg       | 2.77 g           |
| CEFACLOR                              | (Ceclor)                  | 125 mg       | Yes (? Amount)   |
|                                       |                           | 250 mg       | Yes (? Amount)   |
| CEFALEXIN                             | (Keflex)                  | 125 mg       | Yes (? Amount)   |
|                                       |                           | 250 mg       | Yes (? Amount)   |
| CLOXACILLIN                           | (orbenin)                 | 250 mg       | 2.5 g            |
| COTRIMOXASOLE                         | (Bactrim)<br>(Septra)     |              | 0                |
|                                       |                           |              | 2.5 g            |
| DIGOXIN                               | (Lanoxin)                 |              | 1.5 g            |
| ERYTHROMYCIN ETHYL SUCCINATE<br>(EES) |                           | 200 mg       | 153 g            |
|                                       |                           | 400 mg       | 173 g            |
| FUROSEMIDE                            | (Lasix)                   |              | 0                |
| PENICILLIN G.                         | (Megacillin)              | 250 mg       | 1.0 g            |
|                                       |                           | 500 mg       | 1.0 g            |
| PENICILLIN V.                         | (Pen Vee)<br>(V-cellin-K) | 180 mg       | 0                |
|                                       |                           | 125 mg       | Yes (? Amount)   |
|                                       |                           | 250 mg       | Yes (? Amount)   |
| PEDIAZOLE                             |                           |              | 1.9 g            |



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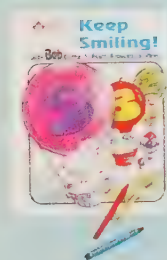
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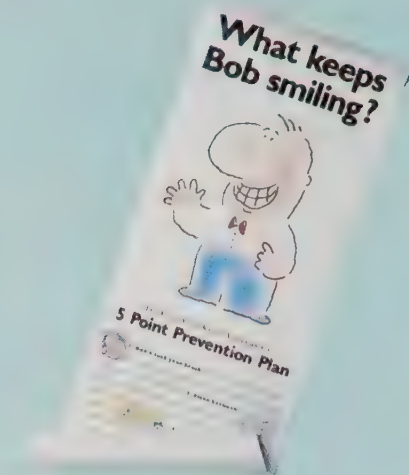
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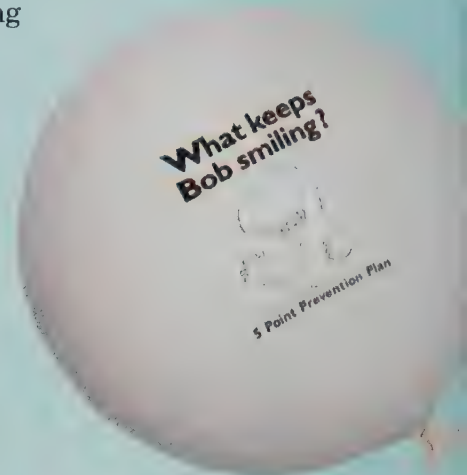
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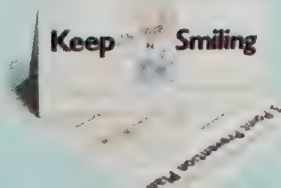


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medications.<sup>6</sup> A list of the sugar (sucrose) content in some common oral antibiotics and cardiovascular medications is provided in Table I.

## Pediatric Cardiac Transplant Patient

Cardiac transplantation has emerged as an accepted treatment modality for adults and children. Since 1980, the one-year survival rate for children under 18 years of age has been 80 per cent, with the five-year survival rate reaching 70 per cent.<sup>13</sup> Cardiac transplantation is indicated in children with end-stage or terminal heart disease for which no reasonable surgical or medical therapy is available.<sup>14,15,16</sup>

It is important to note that, following cardiac transplantation, this population will be immunocompromised for the remainder of their lives. The dental considerations for treating these individuals can therefore be divided into two time periods – the pre-transplant and the post-transplant phases of care.

The number one cause of death in the cardiac transplant population is infection. Thus, a patient's pre-transplant evaluation should be aimed at eliminating current oral infection, as well as the potential for developing acute oral infection during the next 12-month period. Sources of infection include severe dental caries with abscess formation, periodontal disease with gingivitis and/or abscess formation, periapical pathology noted on radiographs, pericoronar infection and others.<sup>17,18</sup>

All patients should be screened prior to the transplantation. This screening should include a comprehensive oral and radiographic examination. Infection of dental origin in the immunocompromised host, left untreated, has led to a variety of complications including fever, septicemia, mediastinitis, osteomyelitis and others.<sup>17</sup>

Paramount to the elimination of existing infection is the establishment of a protocol to prevent the development of new infections, both prior to and after transplantation. An aggressive preventive program should be instituted. This should include periodontal therapy and prophylaxis, fabrication of fluoride trays for in-home application, the in-home use of a fluoride mouth rinse (if patient is capable of doing this), and oral hygiene education. In addition, frequent recalls, depending on the patient and parent cooperation, should be established. Ideally, recalls should occur at intervals of no longer than three to

**Table II**

## The Major Drugs Used to Combat Oral Infection and Their Side Effects

| Drug                     | Side Effects                                                                             |
|--------------------------|------------------------------------------------------------------------------------------|
| CYCLOSPORIN (Sandimmune) | Nephrotoxicity, hepatotoxicity, hypertension, gingival overgrowth and hirsutism          |
| NEFEDIPINE (Procardia)   | Gingival overgrowth                                                                      |
| PREDNISONE               | Adrenal suppression, masking signs of infection, impaired wound healing                  |
| AZATHROPRINE (Imuran)    | Hepatotoxicity, agranulocytosis and increased susceptibility to infection. <sup>13</sup> |

four months. The elimination of orthodontic bands may also be indicated, given the potential for gingival irritation, plaque retention and possible infection.

Prior to initiating any dental care, the dentist should consult with the patient's pediatrician and/or the pediatric cardiologist. The consultation should address the plan for eliminating possible causes of infection and the patient's medical stability.

Once the transplantation procedure is complete, the patient faces a lifetime of drug therapy to prevent organ rejection. Most of this therapy is immunosuppressive in nature, increasing the patient's risk for developing infection. However, it is primarily the different drug therapies used and their complications that influence considerations in providing dental care.

The iatrogenic deficiency that follows immunosuppressive drug therapy is primarily T cell in nature (cellular immunity), making the patient more susceptible to fungal and viral infections. It is not uncommon for these individuals to present with oral candidiasis.<sup>19</sup> Antifungal therapy is often maintained prophylactically by the physician. However, if candidiasis is suspected, a swab for candida should be obtained and antifungal therapy changed or instituted.

Viral lesions are also noted with some frequency. If this occurs, a cytologic smear, looking for inclusion bodies, as well as cultures, should be obtained. The initiation of an antiviral chemotherapeutic regimen should only be done in consultation with the pediatrician/pediatric cardiologist.

The use of pre-dental care antibiotic

prophylaxis has been controversial. The majority of institutions recommend the standard regimen suggested by the American Heart Association to prevent infection to the immunocompromised host. However, there are institutions which believe that the selection of resistant organisms, as well as the change in the oral cavity microflora, preclude the use of any antibiotics.<sup>17,20</sup>

If the patient is able, an antimicrobial mouth rinse (chlorhexidine gluconate) should be used in addition to preoperative antibiotics. In cases where the patient is too young, and incapable of rinsing, the rinse should be swabbed or irrigated around the necks of the teeth prior to care. This reduces the microbiologic flora and the risk of developing an infection during and after the procedure.

The presentation of oral infection can often be masked by immunosuppression. Therefore, the frequent recalls and aggressive prevention program recommended for the pre-transplant phase of care should be continued during the post-transplant phase.<sup>2</sup> In the event that the patient develops an oral infection, aggressive management should be employed. It should include cultures, sensitivities and the appropriate antibiotic therapy.<sup>2</sup>

The medications administered to the cardiac transplantation population have numerous side effects that impact on the provision of dental care. The major drugs and their side effects are shown in Table II.

The development of hypertension, although not as significant in the pediatric population, can occur secondarily to cyclosporin therapy. It is usually managed by antihypertensive medica-



tions without incidence. However, nifedipine (Procardia), a calcium channel blocker often used to control hypertension in this group, may cause gingival overgrowth.

Gingival overgrowth is a significant side effect of cyclosporin and Procardia administration within the pediatric population at Columbia Presbyterian Medical Centre, with an observed incidence of greater than 70 per cent.<sup>13</sup> Procardia or cyclosporin-related gingival overgrowth is indistinguishable histologically from other types of drug-induced overgrowth, and there may be some correlation to gingival irritation from plaque and orthodontic appliances.<sup>22,23,24</sup>

Cardiac transplantation in the pediatric patient population is an acceptable treatment modality. The number of organ transplant recipients is increasing at a rapid rate – limited only by the ability to procure suitable organs and the number of transplant facilities available. These patients will become an increasing part of our patient population.

## Summary

The treatment plan for the pediatric cardiac patient must include the following:

1. A complete medical history that will elicit adequate information with respect to the patient's possible heart condition.

2. Consultation with the family physician, pediatrician and/or cardiologist to learn the specific nature of the defect, specific past history, the child's ability to tolerate stress and anxiety, current medication and any specific recommendations for patient management.

3. Antibiotic prophylaxis, in an effort to prevent endocarditis, for all dental procedures that are likely to result in gingival bleeding, including routine professional cleaning. Application of chlorhexedine may be used as an adjunct to antibiotic prophylaxis, particularly in patients who are at high risk and/or with poor dental hygiene.

4. Prompt and vigorous treatment of all infections, with extraction to be considered as the preferred treatment for endodontically involved primary teeth.

5. A frank and open discussion with the parents and patient, detailing the importance of strict oral hygiene and regular dental care for both the oral and general health of the patient.

As important as appropriate antibiotic prophylaxis is to the patient's continued health, it must be stated in summation that the dentist's efforts to foster

optimal oral health are perhaps even more significant. Dental manipulation is in no way essential to the genesis of bacteremia, and it must be assumed that frequent showers of organisms are the rule in individuals who neglect their mouths. Perhaps the dentist performs the greatest service for this group when he or she succeeds in significantly modifying their oral hygiene behavior, thus preventing inadvertent septic "suicide."

*Dr. Creighton has a private pediatric dental practice in Ottawa and is on the active staff of the dental department of the Children's Hospital of Eastern Ontario.*

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## Editor's Note:

Over a year ago, when our initial plans for a series of articles on dental care for pediatric oncology patients began to take shape, we thought two or three articles would suffice. However, as conversations with the medical and dental specialists continued, and papers were developed, it soon became clear that a more extensive review of the topic was needed.

Therefore, we are pleased to continue the pedodontic/oncology theme introduced with the February 1992 issue. The Journal again extends its sincere thanks to the dedicated medical and dental staff at the Children's Hospital of Eastern Ontario for their contribution and cooperation.



# Specialty Feature

## Congenital Cardiac Disease and Contemporary Dental Care of the Pediatric Patient: A Cardiologist's Point of View

Walter J. Duncan, MD, FRCPC

### ABSTRACT

*Good dental health makes common sense – even more so in patients with underlying cardiac abnormalities. Today, the practising dentist may be confronted by an ever-increasing cohort of patients who have survived complicated repairs of congenital cardiac abnormalities. A basic knowledge of such conditions is useful, primarily to gain an understanding of the physiological abnormalities that may be adversely influenced by dental manipulation. This article reviews some of the important points that practising dentists should know about patients with congenital cardiac disease.*

### SOMMAIRE

*Il est sage d'avoir une bonne hygiène bucco-dentaire, surtout si l'on a des anomalies cardiaques. Aujourd'hui, les dentistes ont de plus en plus de patients ayant subi des opérations pour une anomalie cardiaque congénitale. Aussi est-il bon d'avoir des connaissances élémentaires à ce sujet, surtout pour comprendre les anomalies physiologiques sur lesquelles les traitements dentaires peuvent avoir des effets contraires. Dans cet article, on revoit certains des éléments importants que le dentiste doit connaître lorsqu'il traite des patients souffrant de maladies cardiaques congénitales.*

### Dental Care/Prophylaxis for Patients With Congenital Cardiac Defects

With each passing year, advances in the care provided to patients with structural congenital cardiac anomalies have resulted in an ever-increasing pool of individuals with special dental requirements. It is becoming the

norm for patients to survive lesions that were previously thought to be fatal. However, many of these patients have a marginal ability to tolerate stress because of their limited cardiac output, persistent cyanosis or intolerance of anesthesia.

The role the dental practitioner plays in the treatment of these individuals is multifaceted. All patients with erupted dentition must be carefully examined prior to cardiac surgery. Existing caries should be repaired. If there is any evidence of an infectious process in the mouth, the condition must be both treated and brought to the attention of the referring cardiologist. Usually, evidence of infection in the oral cavity will prompt cancellation of the prospective surgery. Almost always, the surgery can be safely deferred until the infection is cleared. The risk of endocarditis or septicemia increases substantially with the manipulation of an infected oral cavity by orotracheal tubes, transesophageal echocardiographic transducers and other esophageal monitoring lines. Prevention of infection is always easier than treating it.

### Postoperative Period

After cardiac surgery, a patient with congenital heart disease requires vigilant, ongoing medical care. The maintenance of good dental health is particularly critical in this patient group. Strict attention to a program of endocarditis prophylaxis is also vital. And because many of these patients have a reduced ability to handle infections, more frequent routine dental assessments should be provided. Meticulous attention to the periodontium is essential.

### Endocarditis Prophylaxis

The recent revision of the standardized recommendations for endocarditis prophylaxis<sup>1</sup> included some significant changes. In a statement en-

dorsed by the American Medical Association and the American Dental Association, amoxicillin has replaced penicillin as the first-line antibiotic for endocarditis prophylaxis. For most patients allergic to penicillin, either erythromycin or clindamycin may be substituted. Amoxicillin is preferred to penicillin because it is better absorbed from the gastrointestinal tract. Tetracyclines and sulphonamides are not recommended for endocarditis prophylaxis.

For patients unable to take oral antibiotics, parenteral ampicillin (or clindamycin) is recommended. In a substantial change of position, the committee on endocarditis prophylaxis now suggests that the standard oral regimen be used in all other patients, even those with prosthetic heart valves. The parenteral regimen may still be used where desired.

Dentists will frequently encounter patients claiming to have a heart murmur. The safest course to follow with these patients is to direct an inquiry to their physician. If a satisfactory response is not obtained, these patients should be given a choice of either receiving prophylactic antibiotics prior to dental work, or deferring the required procedures until a clarification of their status can be made. Most patients with significant cardiac problems are well informed, and will be able to tell the dentist about the precise nature of their heart condition.

It is not uncommon for cardiac patients to indicate a past history of rheumatic fever or scarlet fever. Not all such people have valve scarring or pathology that would require BE prophylaxis. The patient's physician should be able to offer advice. In a general sense, however, it is safer to offer BE prophylaxis than it is to risk the possibility of the patient developing endocarditis. The low risk of allergic reactions in patients not historically allergic to antibiotics makes the administration of routine BE



prophylaxis a well-tolerated and safe option.

## Special Problems

Certain patients may have specific dental requirements. Those with prosthetic valves, for example, are on continuous anticoagulant therapy. The risk of bleeding is therefore increased, and a confirmation of the patient's coagulation status is essential prior to undertaking major dental manipulation or extractions. Most patients on Coumadin (warfarin) will maintain prothrombin times at 150-200 per cent of normal. Some centres feel that this is unlikely to produce life-threatening bleeding, whereas others will admit the patient and electively initiate heparin therapy after discontinuing warfarin. A patient's coagulation status can be influenced more acutely by monitoring heparin with a continuous infusion. Intramuscular injections should also be avoided in anticoagulated individuals.

Patients who have undergone more radical repairs of congenital cardiac malformations may include those who have had Fontan's procedure. In this operation, the absence or hypoplasia of the right heart necessitates the direct anastomosis of the vena cavae to the pulmonary artery. These patients may not tolerate prolonged or difficult procedures if the cardiac output is compromised. Some may not be able to handle prolonged supine positioning.

Dental anesthesia for patients with congenital cardiac problems is best given in a hospital setting, where full monitoring and resuscitative equipment is at hand. These procedures should be performed only by qualified anesthetists who are accustomed to anesthetizing patients with cardiac abnormalities. This may be critically important in patients with pulmonary hypertension – these individuals tolerate hypoxia very poorly. They should also not be given ketamine for anesthesia, as this agent will further increase pulmonary vascular resistance. Continuous electrocardiographic monitoring and transcutaneous oximetry must be utilized during such procedures.

For the most part, however, procedures done under local anesthesia in the general population may be employed, unchanged, in most patients with congenital heart disease. When in doubt about the advisability of using epinephrine-containing local anesthetics, a consultation with an anesthetist or cardiologist is indicated. For most patients, the small amount of epinephrine in-

involved in dental anesthesia is not likely to cause serious cardiovascular compromise.

## Clinical Classification of Cardiovascular Defects

Although far from complete, a simplistic classification of cardiovascular defects would include three major groups. In each group, the major element could be:

1) a left to right shunt (ie: from systemic to pulmonary circulation) with the potential for congestive failure.

2) a right to left shunt (ie: from the pulmonary to systemic circulation) with clinical cyanosis.

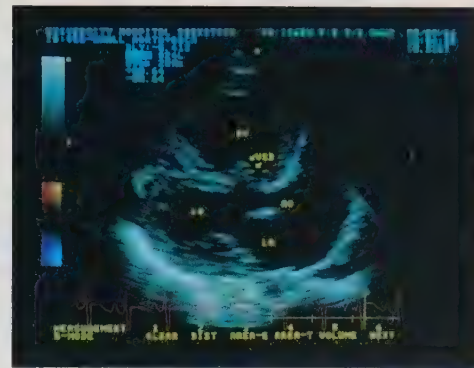
3) an obstruction or major regurgitation involving cardiac flow, be it at the level of inlet or outlet valves, or at great artery level. Congestive failure would be the major manifestation of this group.

### Group One – Left to Right Shunts

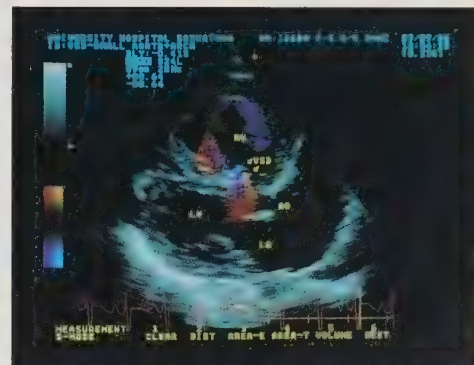
Patients with defects in the cardiac septa (ventricular, atrial or both) or communications at great artery level (usually patent ductus arteriosus) have left to right shunts. These shunts may be tolerated without difficulty unless the shunt is associated with pulmonary hypertension, or is of such a magnitude that cardiac failure ensues.

### Ventricular Septal Defect

This is the most common congenital cardiac defect, comprising nearly 30 per cent of all structural defects of clinical importance. Most of these defects are not hemodynamically important and will close spontaneously. Large defects that are of sufficient size to require surgical repair will usually be corrected prior to 18-24 months of age. As shown in Fig. 1, echocardiography with color Doppler flow imaging has now become the standard method of assessing patients with ventricular septal defects (VSD). Peak flow velocity is measured by continuous wave Doppler (Fig. 2), which can be used to separate small defects (where there is a large pressure difference between the left and right ventricles) from more important moderate to large VSDs. Many patients will have residual defects after surgical patch closure of their VSD. Such patients will still require endocarditis prophylaxis. Prophylaxis is no longer required in patients with complete closure of their VSD (except during the first six postoperative months).



**Fig. 1A:** Parasternal long axis view of the heart with left ventricle (LV) lying posteriorly. The area of the ventricular septal defect (VSD) is identified by arrows. There is out-pouching of tissue towards the right ventricle (RV) produced by a weakness in this area. (AO = aorta)



**Fig. 1B:** Doppler color flow imaging shows the blood flowing left-to-right from left ventricle (LV) to right ventricle (RV) across the margins of the ventricular septal defect (VSD). In this principle of physics, the Doppler formula is applied to the pathway of the flowing blood and is color coded by direction – the blood flowing toward the transducer (the top of the picture) is red whereas that flowing away from the transducer is blue. Beyond a certain velocity range however, the color will "alias" or appear to switch from blue to red during the flow pattern – this indicates high velocity flow. High velocity flow is measured by continuous wave Doppler (see Fig. 2 below). (AO = aorta)

### Atrial Septal Defect

Communications between the left and right atria will allow a left to right shunt (Fig. 3). Obviously, the magnitude of the shunt is entirely dependent upon the size of the defect. Atrial septal defects (ASD) are not usually associated with pulmonary hypertension (in children) as the pulmonary arterial bed is very compliant and can accommodate large volumes of blood flow. These defects may occur at the superior-posterior aspect of the atrial septum (sinus venosus defect), the mid portion (secundum defect), or the inferior pole close to the atrioventricular valves (pri-





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mum septum). Surgical repair is still required for defects where the measured shunt exceeds 2:1 (ie: twice the volume of pulmonary artery flow compared to systemic flow). New interventional catheterization techniques allow for nonsurgical closure of secundum ASDs where the defect is centrally positioned and less than 25 mm in diameter. Endocarditis prophylaxis is generally not required after surgical or transcatheter closure of an ASD.

### Patent Ductus Arteriosus

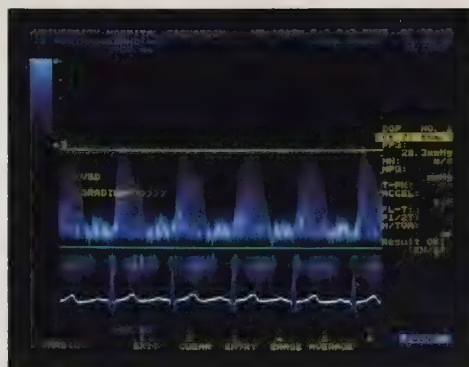
The ductus arteriosus, normally patent during fetal life, closes during the first few days of life in most people. When it remains patent, a typical continuous systolic and diastolic murmur is heard. The diagnosis is easily confirmed by echo Doppler assessment (Fig. 4) and closure is performed using a transcatheter device or by surgical ligation. Patent ductus arteriosus (PDA) is always treated because of the risk of endarteritis from the jet lesion flowing between the aorta and the pulmonary artery.

### Group Two – Right to Left Shunts

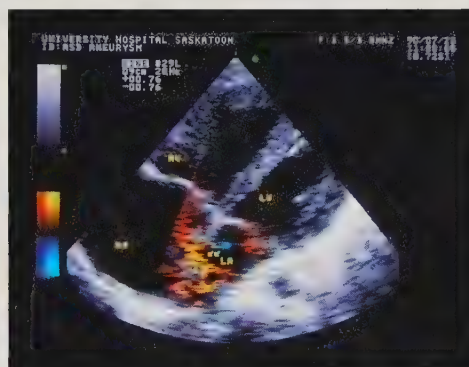
With ongoing advances in medicine, the number of patients with clinical cyanosis seeking dental assessment is declining day by day. Many lesions that were previously viewed as incurable are now correctable – often in the first two years of life. Some patients, however, can only receive palliative surgery because of anatomical complexities. Other patients may have developed irreversible pulmonary hypertension and not be candidates for contemporary surgical repair. They may still survive to undergo cardiopulmonary transplantation.

### Tricuspid Atresia

When the tricuspid valve is absent, clinical cyanosis is present because venous blood passes through the atrial septum and mixes with systemic blood. Patients with this condition usually require interim palliative procedures before undergoing an atriopulmonary (Fontan) repair and ASD closure. Fontan procedures are often carried out at a slightly later patient age compared to most other types of congenital cardiac surgery. If such patients, or any other children with right to left shunts, undergo surgical procedures, extreme caution must be applied with intravenous lines and injections. Any bubbles pass-



**Fig. 2:** Continuous wave spectral Doppler display showing the left-to-right flow pattern across the ventricular septal defect (VSD). Using on-line software, one can calculate a peak systolic gradient which in this instance is estimated at 28.3 mmHg between left (LV) and right (RV) ventricles. (AO = aorta)



**Fig. 3A:** A "four-chamber view" showing the ventricles at the top of the image cone with the atria lying posteriorly. With color flow imaging, blood passes between left atrium (LA) and right atrium (RA) as depicted by the passage of red color between the left and the right side.

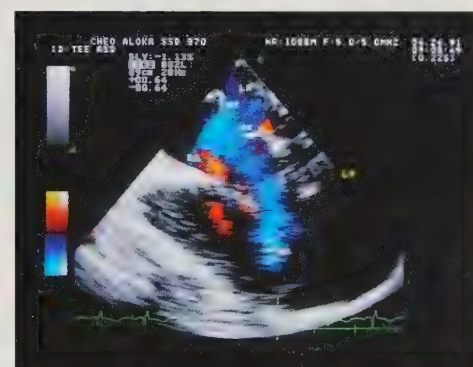
ing into the vein may travel directly into the cerebral or coronary circulation with potentially disastrous consequences.

### Transposition of the Great Arteries

In this condition, the aorta arises from the right ventricle. Nearly all patients who were born cyanotic, with transposition of the great arteries, would have had corrective surgery by the time they need dental care, and will no longer be cyanotic. With rare exceptions, these children undergo an arterial switch operation with coronary artery reimplantation to correct the malformation within the first two weeks of life. A small group of patients with transposition of the great arteries as just one part of a more complex congenital cardiac anomaly will have persistent cyanosis. Radical surgery has been extended to nearly all transposition patients however, so that cyanosis is becoming an



**Fig. 3B:** Transesophageal echocardiogram performed with the transducer lying posterior to the heart – hence the atria are the closest structure to it. This shows a large deficiency in the interatrial septum (between the X marks measuring 1.3 cm). (VSD = ventricular septal defect, AO = aorta, LV = left ventricle)



**Fig. 3C:** Same view as Fig. 3B above. The additional color flow imaging shows the left to right passage of blood – in this instance depicted as blue flow moving away from the transducer between the defect edges as blood passes between left atrium and right atrium on its way into the right ventricle (RV). (VSD = ventricular septal defect, AO = aorta, LV = left ventricle)

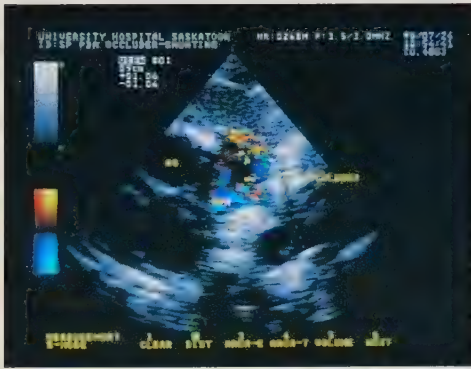
unusual feature beyond the age of four to six years.

### Group Three – Obstructive Lesions

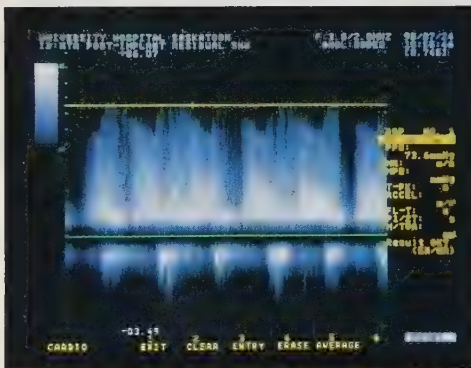
#### Aortic Stenosis

Obstruction to the left ventricular outflow may occur at, below or above the aortic valve leaflets. Valvular obstruction is the most common, and is almost always progressive. Most children with obstruction to the left ventricular outflow will be asymptomatic, but some may have angina, syncope or other serious symptoms. Such symptoms are sinister and will warrant treatment by transcatheter balloon dilatation valvuloplasty or surgical valvotomy. These procedures may relieve the obstruction but render the valve regurgitant. Excessive regurgitation will cause the left ventricle to dilate and produce





**Fig. 4A:** A short axis view at the level of the great arteries showing the aorta (AO) as a circle and the main pulmonary artery wrapping around it. A releasable device occluder has been placed in the ductus arteriosus and produces an ultrasound artifact (arrows). There is a small jet of residual shunting between aorta and pulmonary (see arrows) which has split into two different directions - one passing superiorly into the head of the MPA and one more laterally. This flow pattern shows a continuous gradient between aorta and pulmonary artery (PA) as is depicted in Fig. 4B below. (RPA = right pulmonary artery)



**Fig. 4B:** Continuous wave Doppler flow pattern across a partially occluded patent ductus. Note the high gradient of 73.6 mmHg indicating a high pressure difference between the aorta and the pulmonary artery following occluder placement. This indicates that the pulmonary artery pressure has fallen to normal values.

congestive heart failure. In this situation, the implantation of artificial (generally metallic) prosthetic valves is required. These patients require meticulous attention as they are on anticoagulants and have a high risk for endocarditis.

### Aortic Arch Obstruction (Coarctation)

Patients with obstruction at arch level have hypertension in the upper extremities and relative hypotension beyond the coarctation. Diagnosis is made by establishing a differential blood pressure beyond the upper and lower limbs - the treatment is generally

surgical repair, often with prosthetic patches. These patients are always at risk for aortitis at the coarctation or surgical site. Dental manipulations that are painful or excessively long should be avoided except if there is active infection or abscess. If infection is present, careful consideration of appropriate antibiotic therapy (usually parenteral) must be made. After surgical repair, most patients are asymptomatic and normotensive, but endocarditis prophylaxis is still required.

### Mitral Stenosis/Regurgitation

Significant obstruction to mitral inflow is uncommon as a manifestation of congenital heart disease. Rheumatic mitral stenosis is still seen, but with antibiotic therapy the incidence in children has fallen substantially over the years. Patients with serious mitral valve disease may have chronic pulmonary compromise from pulmonary edema. They may be on diuretics or digoxin therapy and have important orthopnea (difficulty breathing while lying flat). Because of this, dental procedures may be best performed upright or at least no less than 75° from supine. Patients with mitral pathology are among those with the highest risk for the development of bacterial endocarditis. The same, of course, applies for patients with mitral prostheses.

### Right Heart Lesions

Obstructive and/or regurgitant lesions of the right heart are common at the pulmonary valve level but do not usually involve the tricuspid valve. Pulmonary stenosis is usually cured by balloon valvuloplasty and pulmonary regurgitation is well tolerated. Right-sided endocarditis is generally uncommon, although some children with long-term intravenous chemotherapy or parenteral nutrition may develop endocarditis from the indwelling intravenous line. Endocarditis of the right heart is otherwise most commonly due to intravenous drug abuse in adults.

### Transplant Patients

Patients who have undergone cardiac transplantation generally enjoy a comfortable lifestyle. They are at increased risk for all types of infection, especially because they are immunocompromised. There is no clear indication for SBE prophylaxis in transplant patients, but a most reasonable approach could be to provide coverage for this small subset of patients.

### Summary

Virtually all congenital cardiac conditions can now be palliated or cured. This approach has produced an ever-enlarging group of patients who will require particularly attentive dental care, both to prevent endocarditis in the perioperative period as well as postoperatively. The dental practitioner has an intricate role in the overall management of patients with congenital heart disease.

*Dr. Duncan is the chief of the division of cardiology at the Children's Hospital of Eastern Ontario and a professor with the department of pediatrics at the University of Ottawa.*

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## Reverse smoking and its effects on the hard palate: A case report

Andrew A. Stoykewych, B.Sc., DMD  
Roland DeBrouwere, B.Sc., DMD, MD  
John B. Curran, BDS, FFDRCS (Irel), FRCD(C)  
Manitoba

### ABSTRACT

*Reverse smoking is a habit that is endemic in many Indian, South American and Caribbean communities. Two case reports of reverse smoking are presented in this paper. Although it causes characteristic changes in the palate, the role of reverse smoking in oral cancer is unclear. No clinical studies are available on reverse smoking using commercially available cigarettes.*

### SOMMAIRES

*Fumer une cigarette le bout allumée dans la bouche est une habitude répandue dans de nombreuses communautés indiennes, sud-américaines et antillaises. Dans cet article, on présente deux cas. Bien que cette habitude cause des changements caractéristiques au palais, on ne sait pas bien quel rôle elle joue dans le développement du cancer buccal. Il n'existe aucune étude clinique touchant la pratique de cette habitude avec des cigarettes de fabrication commerciale.*

Reverse smoking is an unusual habit that is endemic in many Indian, South American and Caribbean communities.<sup>1</sup>

To practise reverse smoking, the tobacco user places the lighted end of the cigarette inside his or her mouth. There are several reasons behind the use of this type of smoking. The smoker enjoys a pleasurable sensation from the heat and the products of tobacco released by the cigarette. In addition, the extended burning time of the cigarette gives a small economic advantage and, from a purely practical aspect, a field hand can smoke on the job without the nuisance of the wind blowing ashes or smoke into his or her face and eyes.<sup>2</sup>

Reverse smoking, practised over a long period of time – usually years – produces several changes in the oral mucosa. The palate, which is particu-

larly exposed, undergoes hyperkeratinization. This appears clinically as a thickened, tough, leathery surface, with occasional areas of burned or charred tissue. In addition, there may be areas of ulceration, scar tissue, and even leukoplakia, which are more likely to occur on the delicate tissues of the lips and lateral aspects of the tongue.

The incidence of leukoplakia is 13.84 times higher in reverse smokers than in regular smokers.<sup>3</sup> These patients usually exhibit some signs of decreased salivary flow and, in most cases, a heavy, black tar deposit on the palatal and lingual surfaces of the teeth.<sup>1</sup>

Histologically, the hard palate of reverse smokers usually shows varying degrees of hyperkeratinization. This is seen as simple hyperkeratosis or as a widening of the stratum corneum and lower stratum granulosum. Other cells appear to be oriented normally. The underlying connective tissue, formed from dense collagen, is usually minimally infiltrated with chronic inflammatory cells<sup>2</sup> (Fig. 1).

Dysplasia or dyskeratosis is not usually seen in reverse smokers, although some malignancies of the hard palate have been reported.<sup>4</sup> This has been a

point of controversy in the literature.

Clinical and statistical reports have shown no correlation between reverse smoking and the development of malignant changes in the palate.<sup>1,2,4</sup> Gupta and colleagues<sup>5</sup> found that the age-adjusted mortality rates for reverse smokers were nearly twice those of non-users of tobacco. While oral cancer explained only a small fraction of this excess mortality, reliable information was not available on the other causes of death. It is not possible to say whether the risk factors studied in relationship to these patients are applicable to the habit of reverse smoking as it is practised in the North American environment.

### Case Report One

A 60-year-old female (Fig. 2) was referred to our consultation clinic for an evaluation of a peculiar lesion on her hard palate. She had immigrated to Canada from Roseles, a town in the Bangesinan province of the Philippines, five years ago. The woman reported that she had practised reverse smoking for at least 10 years. She grew her own tobacco in the Philippines, but now used commercially available Canadian brands. She complained that the roof of

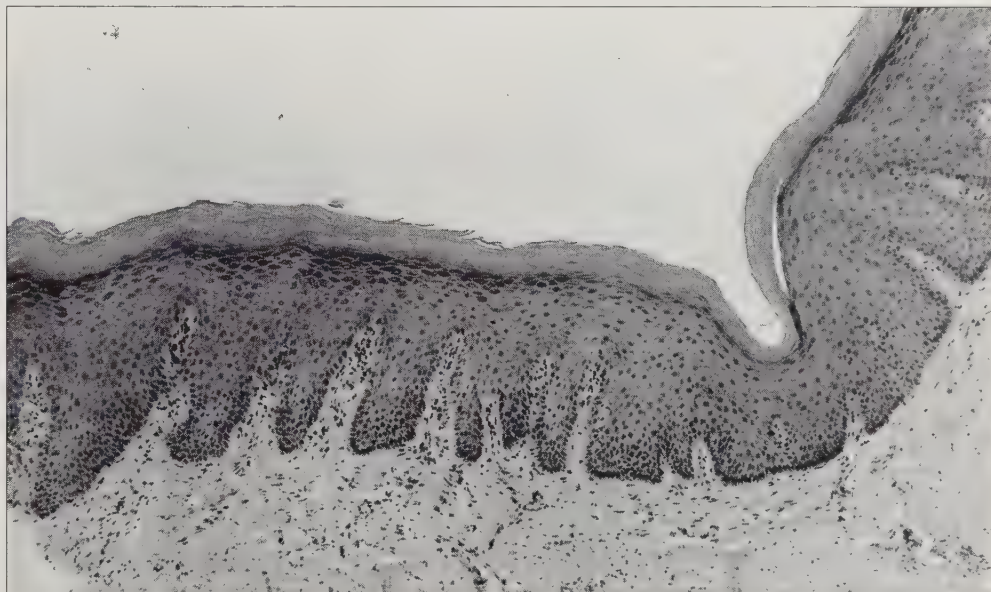


Fig. 1: Photomicrograph of a reverse smokers palatal tissue.



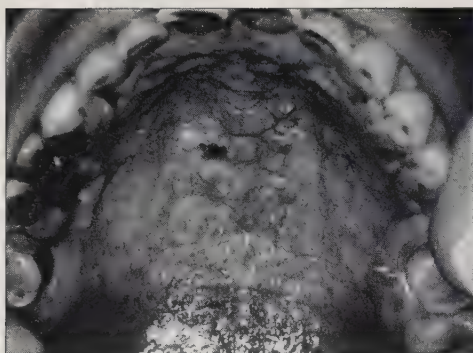


Fig. 2: Case # 1, demonstrating characteristic oral changes.

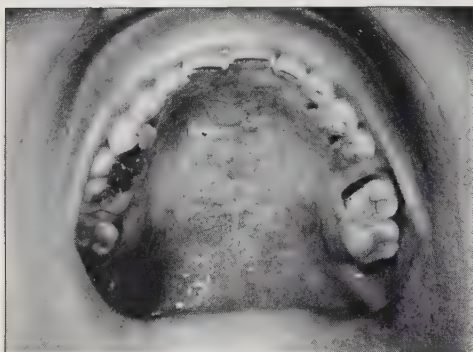


Fig. 3: Case # 2, demonstrating characteristic oral changes.

her mouth felt rougher in the past three weeks. Her main concern was that her friend had died from a "hole in the roof of her mouth," which was attributed to reverse smoking.

Examination of the woman's palate revealed a white lesion that covered the entire hard palate. Minor salivary glands stood out as red spots, as in nicotine stomatitis. An area of charred tissue was seen near the palatal midline. Her mouth appeared very dry, with moderate dark staining on the lingual and palatal surfaces of all teeth. No nodes were palpable in the neck.

A biopsy was performed on the hard palate which showed moderate hyperkeratinization of the epithelium. No dysplasia was seen.

The patient was counselled on her need to give up her habit. She has been followed up for four years and no changes in the appearance of her palate have been noted. Despite her fears, she had been unable to quit reverse smoking.

## Case Report Two

A 50-year-old female (Fig. 3) was referred to our clinic for an evaluation of an unusual palatal lesion. This lady had immigrated to Canada from the Caribbean. Her clinical history was similar to that of the woman described in case number one. Again, a biopsy revealed

hyperkeratinization of the epithelium without dysplasia. The patient recently moved to the United States. She was advised of the importance of continued follow-up care.

## Discussion

As stated previously, the literature has been controversial on the subject of whether reverse smoking leads to a malignant transformation of the palatal tissues.<sup>1,2,4</sup> No clinical studies are available on the use of commercially available cigarettes – and their effects on the oral cavity – in reverse smoking.

The hard palate appears to be an area that is resistant to malignant transformation. However, changes in the palatal tissues should not be ignored. It is the practitioner's responsibility to follow any mucosal changes, as well as to counsel patients on the effects of various habits. To do this, the dentist must be aware of any usual customs his or her patients may have.

## Summary

Two case reports have been presented involving patients with the unusual habit of reverse smoking. The need for the dental practitioner to recognize the oral changes accompanying this habit and the need for regular follow-up is emphasized.

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## The role of saliva in oral health and the causes and effects of xerostomia

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### Introduction

In dentistry, saliva is sometimes seen as an inconvenience that complicates restorative dental procedures. However, it is vital for the maintenance of oral health and function.

A complex secretion, saliva is formed primarily from salivary gland secretions, but also contains components of serum via the gingival crevice fluid and microbial products. In addition to the maintenance and protection of oral soft and hard tissues, it is required for the mastication of food, for taste, and for the lubrication of the tongue to facilitate speech and swallowing.

This article reviews the role of saliva in oral and dental health and in the evaluation of xerostomia. A previous article (Management of xerostomia. *J Canad Dent Assoc* 58(2):140-143) outlined various treatment protocols for patients with xerostomia.

### Introduction

*Dans l'exercice de la dentisterie, la salive passe pour gêner les procédures de restauration. Pourtant, elle est importante pour assurer le maintien de la santé et des fonctions bucco-dentaires.*

*La salive est une sécrétion complexe provenant principalement des glandes salivaires, mais elle contient aussi des éléments du sérum provenant du liquide qui s'écoule des sillons gingivaux. En plus d'entretenir et de protéger les tissus durs et mous de la bouche, la salive est nécessaire pour mastiquer les aliments, les goûter et lubrifier la langue lorsqu'on avale ou qu'on parle.*

*Cet article porte sur le rôle de la salive dans l'hygiène bucco-dentaire et sur la xérostomie. Dans un article précédent, on a parlé du traitement des patients souffrant de cette maladie.*

### Normal Salivary Physiology

#### (a) Saliva Production

The range of salivary production is

very large<sup>1</sup> and varies with the time of day, the age, sex and size of the individual, and the conditions under which the sample is collected.

The normal daily production of saliva is approximately 500 mL. About 200 mL are secreted during eating. The remainder is unstimulated or resting saliva. Approximately 0.3 mL per minute of saliva are produced at rest and 10 times as much during stimulation (two to three mL per minute). A resting saliva rate less than 0.1 to 0.2 mL per minute is abnormal, as is a stimulated rate of less than 0.5 to 0.7 mL per minute.<sup>2-4</sup>

### Table I

#### Functions of oral Secretions and Saliva

|                                          |
|------------------------------------------|
| Antimicrobial (bacterial, fungal, viral) |
| - Remineralization                       |
| - Buffering                              |
| Maintenance of mucosal integrity         |
| Cleansing                                |
| Lubrication                              |
| Digestive                                |

#### (b) Functions of saliva

Saliva's principal functions (Table I) are to protect oral hard and soft tissues, and to facilitate speech, mastication and deglutition.<sup>2,5-19</sup> The protective functions are partly non-specific, providing a diluting and cleansing effect in the mouth. Specific, antimicrobial functions are mediated by enzymes such as lysozyme, lactoferrin and lactoperoxidase, and by mucins, histatins, cystatins and specific antimicrobial immunoglobulins. The important effects of the antibodies and other glycoproteins present in saliva are on the prevention of microbial colonization and infection by preventing adherence to oral sites.

Dentists have been particularly inter-

ested in the role saliva plays in the prevention of dental caries. This includes a salivary buffering system of bicarbonate and phosphate ions in addition to nonspecific proteins, and a remineralizing capability based on a supersaturated calcium phosphate environment and the presence of fluoride and glycoproteins, including statherin.

The lubrication of mucosal surfaces by various salivary glycoproteins (proline-rich proteins) and mucins assists in mastication, swallowing and speech, and also in preventing infections such as candidiasis. Mucosal integrity is maintained by this fluid flow, and by the mucins, electrolytes and water present in saliva.

Saliva also has a role in the preparation of food in the oral cavity to allow taste and in preparing the food bolus for swallowing. The role of saliva in digestion is certainly minimal, though amylase may contribute to the overall process.

### Xerostomia

Xerostomia can be imagined or real.<sup>10,20-26</sup> Objective xerostomia may be caused by systemic diseases or be iatrogenic – produced by pharmacologically active agents or by cancer therapies such as ionizing radiation and chemotherapy. Women complain of xerostomia, and are affected by the condition, more frequently than men.<sup>24</sup> Data on the influence of other factors, such as age, are contradictory. The incidence of xerostomia has been reported to increase with age, but this may relate to the growing use of medications in the elderly population. Even those individuals who are not on xerogenergic medications may have dry mouth, however.<sup>24,27-31</sup>

Systemic disorders that may result in a dry mouth include connective tissue diseases associated with Sjögren's syndrome. These include rheumatoid diseases, systemic lupus erythematosus, progressive systemic sclerosis, primary biliary cirrhosis and atrophic gastritis.



Other disorders such as diabetes mellitus, cystic fibrosis, sarcoidosis, neurologic diseases and dehydration may also cause xerostomia.<sup>2,4,9,32,33</sup> Dry mouth has been recorded with greater frequency in individuals affected by HIV disease than in age and sex matched individuals.<sup>34,35</sup>

Medications implicated in xerostomia include anti-anxiety, antidepressant, antipsychotic, antihistamine, antihypertensive, anti-Parkinsonian, anticholinergic agents and sedatives and hypnotics, including alcohol.<sup>4,20,23,26</sup>

A number of cancer treatments cause xerostomia, particularly ionizing radiation in the head and neck region.<sup>36-44</sup> Radiation damages both the salivary secretory acini and the vascular supply, and can have a rapid effect. There can be a greater than 50 per cent reduction in saliva production volumes after one week of radiation therapy (220 cGy per fraction), and a greater than 75 per cent reduction at the end of radiotherapy for head and neck squamous cell carcinomas. More than 95 per cent of gland function can be lost for up to three years following radiation therapy for oral cancers – and the xerostomia may be irreversible.

The production of saliva can also be dramatically affected when 1,000 cGy are delivered to the salivary glands. Radiation therapy delivered in the treatment of Hodgkin's disease (mantle radiation), where a proportion of the field extends from the chin to the region of the mastoid process, thus including virtually all of the parotid and other salivary tissues, may have pronounced effects on gland function. Irradiation for Hodgkin's disease, as well as total body irradiation for bone marrow transplantation, can therefore significantly affect salivary production.<sup>45-47</sup>

Cancer chemotherapy can also impair salivation, although it is not clear which drugs or dosages most frequently result in xerostomia. However, there are reports of short-term xerostomia and of changes in buffering capacity and salivary flora following chemotherapy. When chemotherapy is repeated at frequent intervals, there may be prolonged xerostomia.<sup>41,46,48-52</sup>

Following bone marrow transplantation, some patients develop a Sjögren's syndrome-like dry mouth, related to graft-versus-host disease, although pre-transplant conditioning, including total body irradiation, is a major contributing factor to clinically significant xerostomia.

### (a) Consequences of xerostomia

Xerostomia predisposes an individual to candidiasis.<sup>54</sup> Other oral complications that can be identified include an increased incidence of dental caries and a change in the distribution of carious lesions. Caries associated with dry mouth frequently involve the gingival proportions of the teeth on both the facial and lingual or palatal aspects, and the cusp tips or incisal edges. In these regions, the teeth may have a white opaque appearance due to demineralization.<sup>21,23</sup>

Oral symptoms show great variability from patient to patient,<sup>21,24,52</sup> but include difficulty in keeping the mouth moist, increased frequency of fluid intake, waking at night to take fluids, difficulty in chewing (especially dry foods such as crackers), difficulty in swallowing, difficulties with speech, and burning or soreness of the oral mucosa, particularly a sore tongue.<sup>55</sup> Additional findings may include mouth sores, cracking or burning at the corners of the mouth, altered or impaired taste sensation, difficulty in the retention and use of dentures, increased rate of dental caries, sialadenitis, and dental hypersensitivity to hot, cold or sweet.

Extraoral complaints may identify systemic conditions or therapies that may have affected the salivary glands. Sjögren's syndrome may be associated with dry eyes and skin or with vaginal dryness and gastrointestinal or bronchial changes. Ocular symptoms can include dry, itching or burning eyes, discharges, a gritty or sandy sensation in the eyes and blurred vision. A dry nose or throat or changes in sense of smell may be reported. In addition, swelling of the lacrimal glands or salivary glands may be noted. In females, vaginal dryness, itching or burning, and a history of recurring vaginal infections may be noted. Similar features may be seen in patients with HIV disease.

A thorough examination of the head and neck is needed, and may reveal swelling of the salivary glands. Bilateral swelling of the major salivary glands may relate to Sjögren's syndrome or, rarely, to the lymphoma that may develop in patients with advanced Sjögren's disease.

Cracking (angular cheilitis) may be seen at the corners of the mouth. The oral mucosa may look dry, smooth and atrophic, with a shiny appearance. There may be associated pallor or redness of the tissue. The tongue may be fissured and crenated. Candidiasis may present as pseudomembranous, erythe-

matous or hyperplastic types.

### (b) Diagnosis of xerostomia

A diagnosis of salivary gland dysfunction should:

(1) establish the severity of the condition and determine if there is objective xerostomia

(2) assess the cause

(3) establish if the hypofunction is reversible

The diagnosis of xerostomia depends mainly on the patient's history and an examination, although tests may help. Reported symptoms do not necessarily correlate with the actual saliva production.<sup>33,51,52</sup> A review of the medical history may reveal systemic disease, medications or therapy that may have influenced salivary gland function. The medical history should focus on connective tissue diseases, diabetes, hypertension, depressive illnesses, and past head or neck irradiation.

The reduction in salivation may be obvious, notably when the saliva pool in the floor of mouth is small or absent, or the only saliva present appears foamy. Saliva may be sticky or tacky. A useful means of identifying oral dryness is to place a dental mirror or tongue blade on the oral mucosa and determine whether there is a stickiness upon removal. The major salivary glands should be assessed to determine if saliva can be milked from their ducts. Salivation should be assessed objectively. In general, a measurement of a whole mixed salivary and oral fluid secretion is collected. A simple means of salivary collection involves expectoration into wide-mouth centrifuged tubes that are graduated and marked in millilitres. Collection can be accomplished in a five-minute period under resting conditions, without chewing or stimulation. The patient is asked not to move his or her tongue or lips in order to stimulate saliva volumes. Whole stimulated saliva may then be collected – using either a wax- or chewing-gum-based product as a masticatory stimulant or a taste stimulant such as 10 per cent citric acid, with collection by expectoration over five minutes. For research purposes in which the origin of the components of secretions are studied, individual gland secretions are required.

Due to the marked variability in salivary function and the importance of the relative changes in salivary flow, a baseline should be collected at a specific time of the day. This should then be compared to follow-up salivary flow



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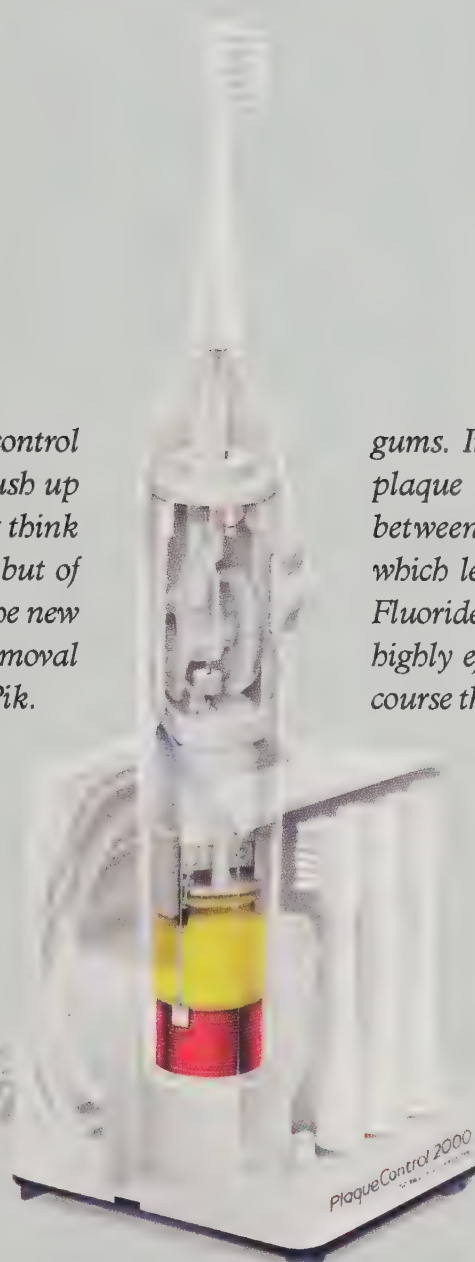
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rate assessments at the same time of day. This is best accomplished in mid-morning or mid-afternoon, so that no tooth brushing or eating occurs during the two hours prior to the collection of the samples. Collections should be done in a quiet, private area. The patient should not be provided with reading material that may contain advertisements for food products. Sialochemistry is currently of little value in the diagnosis of xerostomia.<sup>56</sup>

Microbiological assessment of the oral environment is of importance in patients with xerostomia because of the predisposition to infections such as candidiasis<sup>54</sup> and caries.<sup>57-59</sup> *Candida* species are, of course, present in the mouths of 40-60 per cent of the normal population,<sup>60</sup> and are increased by xerostomia and radiation therapy.<sup>61,62</sup> Candidiasis is the most common oral finding in individuals infected with HIV, and xerostomia is often reported as well.<sup>63,64</sup> The caries risk assessment includes quantitative counts of *Streptococcus mutans* and *Lactobacillus* species.<sup>57-59</sup> *Streptococcus mutans* counts have been statistically correlated with caries risk; *Lactobacillus* counts reflect the dietary carbohydrate intake in children and young adults. However, in patients who have received radiotherapy for oral cancer, the radiotherapy and dietary changes (as well as continued smoking and alcohol consumption) influence the flora, and in these patients *Streptococcus mutans* and *Lactobacilli* have both been shown to correlate with cariogenic risk.<sup>58,59</sup>

A biopsy is not commonly indicated in the diagnosis of dry mouth. However, in suspected Sjögren's syndrome or sarcoidosis, biopsy of the minor salivary glands of the lip can be an important diagnostic procedure.<sup>23,26</sup> Labial gland biopsy is important in the assessment of graft-versus-host disease after bone marrow transplantation.<sup>65,66</sup>

Sialography provides information primarily on the ductal anatomy and the acinar structures of the gland, and shows duct dilatation (sialectasis) in Sjögren's syndrome, and may demonstrate masses in the gland, but is non-specific, somewhat invasive, and only examines the gland tested.

Salivary gland scintigraphy measures, with a gamma scintillation camera, the uptake and excretion of technetium in all glands.<sup>26,67</sup> Uptake is diminished in Sjögren's syndrome. This technique is not universally available.

## Summary

Saliva is an extremely vital fluid in the maintenance of oral homeostasis. Its reduction predisposes individuals to oral symptoms and oral disease. The dental practitioner must be aware of the importance of saliva and be involved in the recognition and diagnosis of problems in salivary function. No other health care worker is more able to thoroughly assess the oral environment and to recognize these oral complications.

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## A retrospective cohort evaluation of preventive resin restorations

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### ABSTRACT

This study measured the longevity and clinical success of preventive resin restorations (PRRs) placed in permanent teeth by multiple operators in the Pediatric Dentistry Clinic at the University of Minnesota. A retrospective chart audit identified patients who had one or more PRRs placed. Only restorations of the occlusal surfaces of the first or second permanent molars were included. Each patient was given a dental examination. On completion, the patient's chronological record of treatment was reviewed for the following information: experience of the operator, type of isolation used, bonding material, liner type, composite resin, and sealant type. Teeth were examined with a front surface dental mirror and a sharp No. 23 dental explorer. Evaluations were made according to criteria developed by Cvar and Ryge,<sup>7</sup> but modified to include a sealant evaluation. Independent measurements were made by each of the two examiners and a consensus was obtained. One hundred restorations were examined in 64 patients. The mean duration of service was 27±13 months. Sealant was evaluated as *alfa* (complete) 26 per cent, *bravo* (incomplete/adequate) 48 per cent, *charlie* (incomplete/inadequate) 21 per cent and *delta* (lost) five per cent. Cavosurface discoloration was evaluated as *alfa* (none) 87 per cent, *bravo* (margin only) 12 per cent, and *charlie* (margin/proceeding toward pulp) one per cent. Anatomical form was evaluated as *alfa* (well contoured) 89 per cent, *bravo* (under contoured/dentin not exposed) 11 per cent. Marginal adaptation was evaluated as *alfa* (no visible crevice) 85 per cent, *bravo* (visible crevice/no dentin exposed) 12 per cent, *charlie* (visible crevice/dentin exposed) two per cent and *delta* (restoration missing) one per cent. Caries were judged as *alfa* (no) 96 per cent and *bravo* (yes) four per cent. Using ANOVA and Chi-Square, no significant relationship was found between sealant retention and

operator, arch location, or age of restoration. Preventive resin restorations are a highly effective treatment for early pit and fissure caries in permanent molars.

### SOMMAIRE

Cette étude avait pour but de déterminer la longévité et le degré de succès clinique des restaurations préventives à la résine que plusieurs praticiens ont effectuées sur des dents permanentes à la Clinique de dentisterie pédiatrique de l'Université du Minnesota. À l'aide d'une fiche d'examen rétrospectif, on a choisi des patients ayant une restauration ou plus à la résine, retenant seulement les restaurations faites sur les surfaces occlusales des premières et deuxième molaires permanentes. On a révisé la séquence des traitements donnés aux patients afin de recueillir les renseignements suivants: expérience du praticien, matériau isolant utilisé, matériau de liaison, sorte de vernis protecteur, sorte de résine composite et sorte de résine de scellement. On a examiné les dents à l'aide d'un miroir frontal et d'une sonde pointue no 23. Pour l'évaluation, on a adopté les critères fixés par Cvar et Ryge (7), y apportant une seule modification afin de pouvoir tenir compte du matériau de scellement utilisé. Les examens ont été faits séparément par deux examinateurs qui ont ensuite comparé leurs résultats de manière à établir un consensus. On a ainsi fait l'examen de 100 restaurations effectuées sur 64 patients. La durée moyenne des services a été de 27±13 mois. Voici les résultats qu'on a obtenus: pour le matériau de scellement: *alfa* (complet) 26%, *bravo* (incomplet/suffisant) 48%, *charlie* (incomplet/insuffisant) 21%, *delta* (raté) 5%; pour les changements de teinte observés à la surface des cavités: *alfa* (aucun) 87%, *bravo* (le bord seulement) 12%, *charlie* (bord/allant vers la pulpe) 1%; pour la forme anatomique: *alfa* (bien profilée) 89%, *bravo* (mal profilée/pas de dentine d'exposée) 11%; pour l'adaptation

marginale: *alfa* (aucune fente visible) 85%, *bravo* (fente visible/pas de dentine d'exposée) 12%, *charlie* (fente visible/dentine exposée) 2%, *delta* (restauration manquante) 1%; pour les caries: *alfa* (non) 96%, *bravo* (oui) 4%. L'analyse de variance et la méthode du Chi<sup>2</sup> n'ont révélé aucun rapport important entre le degré de rétention du matériau de scellement et le praticien ou la position de l'arc ou l'âge de la restauration. On a donc conclu que les restaurations préventives à la résine sont un traitement efficace pour corriger les débuts de carie du sillon aux molaires permanentes.

### Introduction

The preventive resin restoration (PRR) was first described by Simonsen and Stallard in 1977.<sup>1</sup> This restoration is both preventive and restorative. It is ideally suited for incipient or small carious lesions on the occlusal surfaces of posterior teeth. Only the area of decay is removed. Remaining caries free susceptible pits and fissures are sealed. In addition to being conservative, the technique is esthetic and has been reported to compare favorably with Class I amalgam restorations.<sup>2</sup>

Several studies<sup>1,3,4</sup> have investigated the clinical durability and longevity of preventive resin restorations. Others have compared these restorations to amalgam restorations,<sup>2</sup> while a number of them have evaluated PRRs that were placed in a dental school setting.<sup>5</sup>

Simonsen<sup>3</sup> placed 232 PRRs and recalled the patients at six month intervals for evaluation. Photographs were taken at the time of placement and at subsequent recall visits. Retention rates for the sealant were 100 per cent at six months, declining to 97 per cent at three years. Welbury et al,<sup>2</sup> in a prospective clinical trial, compared occlusal amalgam restorations and PRRs in a group of 103 young patients over a five-year period. They found no significant differences in the median survival times be-



tween amalgam and PRR. However, they reported significant loss of sealant material, approximately 40 per cent, after five years. In another prospective study, Houpt et al<sup>4</sup> examined 332 restorations. They found that the sealant was completely retained at three years in 82 per cent of these restorations, with retention declining to 65 per cent at 6.5 years. Only two of the teeth were carious. Stanley et al<sup>5</sup> examined 130 restorations, placed five to nine years previously, and found 89 per cent sealant retention after five years. Two teeth had recurrent decay. Walker et al's<sup>6</sup> study of restorations placed at a dental school found similar results. They examined 328 restorations using a modified Cvar and Ryge rating scale, and examined both primary and permanent teeth. They reported complete retention of the sealant in 82 per cent of these cases. Caries were found in only 17 of the 328 restorations examined.

It is difficult to compare these studies because of the different recall intervals and evaluation criteria. However, some common conclusions can be drawn from all five studies. The restorations appeared to be clinically successful after several years of service. Several investigators<sup>3,5</sup> recognized that sealant loss increased over time. This was the most frequently encountered problem. Loss of sealant did not usually result in the failure of the restoration, but in all cases of recurrent decay there had been sealant loss. The apparent clinical success of these restorations, even after substantial sealant loss, warrants further investigation.

The purpose of this study was to measure the length of service and clinical success of preventive resin restorations placed in permanent teeth by multiple operators in a dental school clinic setting.

## Materials and Methods

Approval for this study was received from the University of Minnesota committee on the use of human subjects in research.

A retrospective chart audit at the University of Minnesota's pediatric dentistry clinic identified a group of prr patients, where each individual had one or more preventive resin restorations placed. The following criteria had been part of clinic protocol for selecting PRR as a treatment option: an explorer catch in the pit or fissure of an otherwise intact occlusal surface; a deep pit or fissure that would prohibit the complete penetration of the sealant; an opaque or

chalky appearance along the pit or fissure suggestive of incipient pit and fissure caries, or a small carious lesion confined to one area of the occlusal surface.

Only restorations placed on the occlusal surface of first or second permanent molars were included. Restorations in place for less than six months were rejected. At the time of each examination, the patient's chronological record of treatment was reviewed for the following information: the period of service of the restoration; the experience of the operator (faculty member, graduate resident or undergraduate student); and the type of isolation (rubber dam, cotton rolls), bonding material, liner (CaOH, glass ionomer), composite resin (p30,<sup>a</sup> p50,<sup>b</sup> Silux<sup>c</sup>) and sealant (white, clear) used.

The patients' charts were reviewed for postoperative complications including sensitivity, and their teeth were examined with a front surface dental mirror and a sharp No. 23 dental explorer. The teeth were air dried and the operatory dental light was used for illumination.

Prior to the investigation, the two examiners (Roth and Conry) calibrated using a standard method.<sup>7</sup> The restorations were evaluated according to the criteria developed by Cvar and Ryge;<sup>7</sup> marginal discoloration, marginal integrity, anatomical form and secondary caries. These criteria were modified to include sealant retention as described by Stanley et al.<sup>5</sup> Independent measurements were made by each examiner,

and where differences existed a consensus for each characteristic was established prior to dismissing the patient.

## Results

One hundred restorations were examined in 64 patients. The duration of service of the restorations ranged from seven months to 71 months, with a mean of 27±13 months (**Fig. 1**). All of the restorations were placed at the University of Minnesota's pediatric dentistry clinic by multiple operators. These included: undergraduate dental students (83 per cent); graduate residents (16 per cent) and faculty members (one per cent). Rubber dam isolation was used in all but four cases where cotton rolls were used. Exposed dentin was covered with a liner in 49 per cent of the cases: CaOH (31 per cent), glass ionomer (18 per cent). Information was not available for the remaining restorations. An intermediate bonding agent was used in 34 per cent of the restorations, while information on the remaining restorations was not available. With the exception of four teeth restored with Silux, the teeth were all restored with P30 or P50. White sealant material, 3M Concise<sup>d</sup> or Heliobond<sup>e</sup> was used.

The interexaminer agreement for the evaluation criteria were: sealant 67 per cent, cavosurface discoloration 85 per cent, anatomical form 88 per cent, marginal adaptation 87 per cent and caries 98 per cent. The results are summarized in **Table I**. The sealant was evaluated as alfa (complete) 26 per cent, bravo (incomplete/adequate) 48 per cent, charlie



*Fig. 1: Distribution of period of service of preventive resin restorations (n=100, range 7-71 months.  $\bar{X}$  = 27±13 months).*



(incomplete/inadequate) 21 per cent and delta (lost) five per cent. The cavo-surface discoloration was evaluated as alfa (none) 87 per cent, bravo (margin only) 12 per cent, and charlie (margin/proceeding toward pulp) one per cent. The anatomical form was evaluated as alfa (well contoured) 89 per cent, bravo (under contoured/dentin not exposed) 11 per cent. Marginal adaptation was evaluated as alfa (no visible crevice) 85 per cent, bravo (visible crevice/no dentin exposed) 12 per cent, charlie (visible crevice/dentin exposed) two per cent and delta (restoration missing) one per cent. Caries were judged as alfa (no) 96 per cent and bravo (yes) four per cent.

The relationship between sealant loss and the age of restoration was examined using analysis of variance. The mean showed a slight tendency toward greater sealant loss in older restorations, but this was not statistically significant ( $F=0.766$ ,  $p=0.47$ ).

A corrected Chi-Square test was used to examine the relationship between sealant retention and operator experience (undergraduate student, graduate resident). No statistically significant relationship was demonstrated ( $X^2=2.074$ ,  $p=0.09$ ). This test was also used to examine the relationship between sealant retention and arch location. The sealant retention rate in the maxillary arch was 79.3 per cent compared to 69.9 per cent in the mandibular arch. These differences were not significant ( $X^2=0.88$ ,  $p=0.34$ ). There was very little difference in sealant retention between first and second molars or between teeth in the mandible and maxilla. Because of low numbers in several categories, these data were not subjected to further statistical analysis.

## Discussion

The interexaminer agreement obtained was comparable to that of other studies.<sup>7</sup> The greatest variability between the examiners occurred when sealant retention was judged. The source of disagreement centred around several factors: extension into buccal and lingual grooves; volume of sealant; and sealant extension onto inclined planes. When the two sealant assessment categories "complete" and "incomplete but adequate" were combined, interexaminer agreement on sealant retention increased from 67 per cent to 86 per cent.

The evaluation criteria developed by Cvar and Ryge<sup>7</sup> were designed specifically for amalgam and composite resto-

rations. As they do not provide for fissure sealant evaluation, we used the modification described by Stanley et al,<sup>5</sup> which rates the sealant portion of the restoration as "complete," "incomplete/adequate," "incomplete/inadequate" or "lost." Furthermore, the Cvar and Ryge criteria were developed to measure intracoronal restorations. The preventive resin restoration is unique because the cavosurface margin may be fully or partially obscured by sealant, making interpretations more difficult. Despite these difficulties, the method provides meaningful data and can justifiably be used in this situation.

Clinical success for this study was defined as adequate sealant retention concurrent with a satisfactory occlusal

composite restoration. Stanley et al<sup>5</sup> recognized that even if some sealant was missing, the restoration could still be adequate. An inadequate sealant does not necessarily result in the failure of a restoration. Therefore, when evaluating the clinical success of preventive resin restorations, both caries prevention and the integrity of the restoration should be considered. In the present study all teeth with an adequate sealant had caries-free composite restorations. Therefore, the composite resin was satisfactory when adequate sealant was present. None of the preventive resin restorations had been replaced by amalgam and only two had been resealed. The sealant was "complete" or "incomplete but adequate" in 74 per cent of the

**TABLE I:**

**Summary table of evaluation scores for each evaluator and consensus scores.**

| Evaluation Scores for All Restorations (n=100) |              |    |           |
|------------------------------------------------|--------------|----|-----------|
|                                                | Investigator |    |           |
|                                                | JC           | AR | Consensus |
| <b>Sealant Retention*</b>                      |              |    |           |
| Alfa (complete)                                | 26           | 39 | 26        |
| Bravo (incomplete/adequate)                    | 48           | 39 | 48        |
| Charlie (incomplete/inadequate)                | 22           | 14 | 21        |
| Delta (lost)                                   | 4            | 9  | 5         |
| <b>Cavosurface Margin Discoloration**</b>      |              |    |           |
| Alfa (none)                                    | 84           | 89 | 87        |
| Bravo (margin only)                            | 14           | 9  | 12        |
| Charlie (margin/proceeding towards pulp)       | 2            | 2  | 1         |
| <b>Anatomical Form**</b>                       |              |    |           |
| Alfa (well contoured)                          | 89           | 89 | 89        |
| Bravo (under contoured/dentin not exposed)     | 9            | 11 | 11        |
| Charlie (under contoured/dentin exposed)       | 2            | 0  | 0         |
| <b>Marginal Adaptation**</b>                   |              |    |           |
| Alfa (no visible crevice)                      | 82           | 88 | 85        |
| Bravo (visible crevice/no dentin exposed)      | 15           | 8  | 12        |
| Charlie (visible crevice/dentin exposed)       | 2            | 3  | 2         |
| Delta (visible crevice/restoration missing)    | 1            | 1  | 1         |
| <b>Caries**</b>                                |              |    |           |
| Alfa (no)                                      | 96           | 96 | 96        |
| Bravo (yes)                                    | 4            | 4  | 4         |
| *Stanley et al (1986)                          |              |    |           |
| **Cvar and Ryge (1971)                         |              |    |           |



restorations. These results are similar to those of other investigators.<sup>4,5,6</sup> Welbury et al<sup>2</sup> had the lowest sealant retention rate (50 per cent). However, those results may have been attributable to the particular sealant material used. In this study, white sealant, Concise or Helioclear, had been used exclusively. In contrast to clear sealant, the opaque material is easier to evaluate clinically. The results reported by Houpt et al<sup>4</sup> may have been influenced by their use of both white and clear sealant. Whenever a specific reason could be attributed to a sealant failure, it was noted at the time of evaluation. One sealant failure revealed air bubbles within the sealant, which may have resulted in microleakage. One failure was recorded on a molar with hypoplastic enamel, where bonding success may have been compromised. In two further cases, old amalgam restorations were replaced with a preventive resin restoration. This resulted in a composite restoration that involved the complete occlusal surface and appeared to be too large. Cavo-surface discoloration was found only on teeth with sealant deficiencies. Marginal staining was associated with sealants that had been partially lost. However, the composite resin restoration was not necessarily discolored at the margins.

In all situations where there was a loss of anatomical form, the sealant was evaluated as incomplete. This was an indication of occlusal wear. The average service period for those preventive resin restorations (n=11) with anatomical wear of bravo (under contoured/dentin not exposed) or charlie (under contoured/dentin exposed) was 28 months.

The marginal adaptation results in this study were somewhat less favorable than those reported by Walker et al.<sup>6</sup> He reported a 98 per cent alfa (no visible crevice) rating, while the present study scored 85 per cent alfa and 12 per cent bravo (visible crevice/no dentin exposed). These results may reflect a more critical attitude on the part of both examiners toward marginal integrity. Exposed dentin or fractured restorations were only found on teeth with recurrent caries.

The agreement rate among the investigators for the detection of recurrent caries was very high (98 per cent). The color of this restoration may actually improve our ability to detect recurrent decay. Recurrent caries were found on four teeth restored with preventive resin restorations. One tooth had brown hypoplastic enamel. The altered calcification of the enamel may have reduced the sealant retention and increased microleakage

around the composite restoration. Another failure occurred when the sealant material was used to fill a very small cavity preparation. In retrospect, it may have been advisable to place a separate composite restoration. The third tooth had a sealant present that was inadequate. It exhibited grey discoloration indicative of caries below the sealant. Failure of the PRR in the fourth case had no unusual characteristics associated with it. However, the sealant was completely lost.

While the clinic protocol clearly mandated the use of rubber dam for placing preventive resin restorations, four of the teeth in this study were isolated with cotton rolls. Incomplete tooth eruption may have prevented the placement of a rubber dam clamp. Three of these teeth were found to require additional sealant. The significance of the method of isolation as a variable was not examined because of the small numbers involved. In other studies<sup>3,4</sup> where cotton roll isolation was used, retention was adequate.

A review of the patient charts did not reveal any patients returning with post-operative sensitivity. Limiting treatment to incipient caries, and the proper utilization of protective liners on exposed dentin, may have contributed to a satisfactory tissue response.

The protocol for PRR specifies the use of a bonding agent prior to composite placement. In 44 per cent of the patient records we examined, this was specifically documented. Stanley et al<sup>5</sup> and Simonsen<sup>3</sup> detail the use of bonding agent prior to composite placement. Other investigators do not refer to its use. The type of composite used was recorded for 58 per cent of the restorations examined in our study. This is comparable to the levels reported elsewhere.<sup>6</sup> In addition, dispensary supply records showed P30 and P50 were the only posterior composites used in the clinic during the time interval in question. Four teeth had been restored with Silux, an anterior composite. These were all rated either alfa or bravo for sealant retention and alfa for all other criteria. Several studies have reported satisfactory results using anterior composites.<sup>2,4,5</sup> However, the success of this material appears to be related to the extent of caries present.

The restorations we evaluated were placed by multiple operators who varied greatly in their level of clinical experience and range of operator skills. Under these circumstances, the high level of success observed for this type of restoration was encouraging. Our results are

similar to those found in earlier reports of restorations placed by multiple operators and dental students.<sup>2,4,6</sup> In contrast, Simonsen<sup>3</sup> had a consistent restoration placement protocol and personally placed each restoration with the aid of the same assistant at the same dental unit. Similarly, Stanley et al<sup>5</sup> reported on restorations placed by a single operator.

## Summary

Preventive resin restorations are a highly effective treatment for early pit and fissure caries. Sealant loss was the most frequent clinical finding, but was not influenced by operator skill or arch location. Sealant loss by itself did not lead to failure of the restoration. There was a tendency for sealant loss to increase with time. In all cases where recurrent occlusal caries were present the sealant was missing or inadequate. The anatomical wear of the composite resin restoration was minimal.

<sup>a</sup>3M Co. St. Paul, Minnesota, U.S.A.

<sup>b</sup>3M Co. St. Paul, Minnesota, U.S.A.

<sup>c</sup>3M Co. St. Paul, Minnesota, U.S.A.

<sup>d</sup>3M Co. St. Paul, Minnesota, U.S.A.

<sup>e</sup>Vivadent, Liechtenstein

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## Temps de mise en place de la digue de caoutchouc par des finissants en médecine dentaire de l'Université de Montréal.

Haig Baltadjian, DDS, M.Sc.D.  
Sahag Mahseredjian

### SOMMAIRE

*Un étudiant de quatrième année, à la faculté de médecine dentaire de l'Université de Montréal, a chronométré la mise en place de la digue de caoutchouc par ses confrères de classe, à leur insu.*

*Il faut, en moyenne, cinq minutes et quatre secondes pour la mise en place de la digue pour commencer à traiter les patients en dentisterie opératoire.*

### ABSTRACT

*Unknown to them, a fourth year dental student at the University of Montreal recorded the amount of time that his classmates required to place rubber dams.*

*On average, it took the students five minutes and four seconds to place the rubber dam and begin providing treatment to the patients attending the school's dental operatory.*

### Introduction

Bien que Prime<sup>1</sup> a relevé 57 raisons en faveur de l'utilisation de la digue de caoutchouc en dentisterie, il y a une certaine réticence de la part des dentistes à l'adopter de routine.

D'après les résultats d'une enquête menée en 1978 par l'auteur,<sup>2</sup> les raisons les plus souvent invoquées par les dentistes de Québec qui n'emploient pas la digue de caoutchouc sont, par ordre d'importance:

1. Je n'en ai pas besoin (28.1 p. cent)
2. C'est une perte de temps (22.3 p. cent)
3. Les patients n'en veulent pas (19 p. cent)

La Porte<sup>3</sup> a chronométré le temps de mise en place de la digue dans un bureau de dentiste et sur 100 applications, la moyenne s'élevait à deux minutes. Heise<sup>4</sup> a trouvé que ça prenait en moyenne une minute et 49 secondes, avec l'aide de son assistante.

Stebner<sup>5</sup> a chronométré le temps pour restaurer une dent en amalgame

de classe II avec et sans l'utilisation de la digue de caoutchouc et a trouvé que le dentiste qui l'utilisait sauvait en moyenne sept minutes et 11 secondes par obturation. Le temps moyen de mise en place de la digue était de deux minutes et 36 secondes.

Cette étude a été menée pour déterminer le temps de mise en place de la digue de caoutchouc par des étudiants de quatrième année.

### Matériel et méthode

Un étudiant de quatrième année a été choisi pour chronométrer le temps de mise en place de la digue de caoutchouc par ses confrères, à l'insu de ceux-ci, dans la clinique de la faculté durant les séances de dentisterie opératoire. Le temps calculé était à partir du moment où l'étudiant(e) opérateur touchait à n'importe quel instrument relié à l'utilisation de la digue, jusqu'au moment où la bouche était prête à être traitée (champ opératoire tout à fait prêt). Les étudiants ont placé la digue sans l'aide d'une assistante.

Le cadre à digue utilisé à la faculté est le modèle de «Young», en forme de «U», en métal. Le poinçon à digue et le porte-crampon sont ceux qu'on retrouve dans la trousse d'étudiants de marque «Ivory.»

### Résultats

Au total 104 temps de mise en place de la digue ont été observés. Les résultats

sont présentés à la fig. 1. Le temps le plus long a été de 11 minutes et 32 secondes et le plus court une minute et 48 secondes. La moyenne est de cinq minutes et quatre secondes, et la médiane est de quatre minutes et 41 secondes. De plus, nous avons représenté deux intervalles qui illustrent respectivement les limites à l'intérieure desquelles 50 p. cent et 90 p. cent des observations se situent. Ainsi, 50 p. cent des observations se situent entre 3.8 et 5.8 minutes alors que 90 p. cent des mesures se situent entre trois et neuf minutes.

### Discussion

On n'a pas tenu compte dans l'étude du nombre de dents isolées, du cadran concerné, de la technique employée, de l'âge du patient(e), de la difficulté du cas, et de l'expérience de l'étudiant(e) concernant l'application de la digue, parce que nous ne voulions pas compliquer l'étude outre mesure, et ce n'était pas non plus dans les objectifs de cette étude.

Le fait de chronométrer le temps à l'insu de l'étudiant(e) aurait certainement pu être un facteur dans le délai obtenu. Nous ne voulions pas influencer l'étudiant(e) au-delà du stress normal du traitement des patients, et nous ne voulions pas non plus influencer sur le variable «temps» dans le sens contraire.

Si on compare nos résultats à ceux des études précédentes,<sup>3,4,5</sup> on peut at-

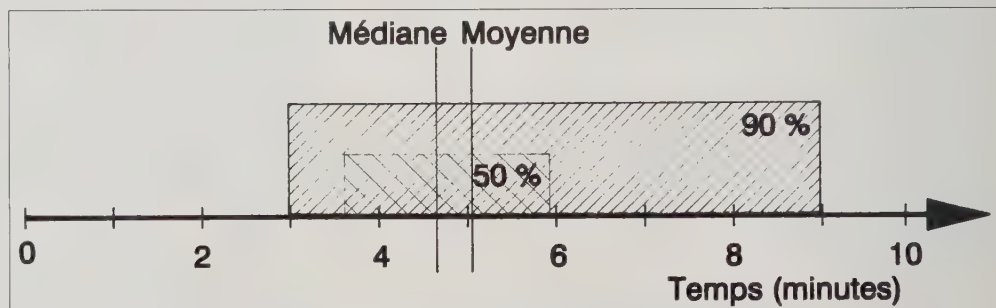


Fig. 1: Temps de mise en place de la digue en caoutchouc



tribuer la différence du temps à l'expérience du dentiste en pratique privée et au manque d'expérience de nos étudiants. Nous pouvons déduire, par conséquent que plus souvent le dentiste pose la digue, plus vite elle sera posée. L'aide d'une assistante diminue aussi nécessairement le temps de mise en place de la digue.

Nos étudiants utilisent la digue à partir du début de la deuxième année, en dentisterie opératoire, sur les dento-formes (mannequins). Ils l'utilisent sur leurs patients, lors des séances régulières de clinique de dentisterie opératoire, en troisième et en quatrième années.

### Conclusion

L'étude démontre qu'il faut en moyenne un peu plus que cinq minutes pour la mise en place de la digue de caoutch-

ouc pour un étudiant de quatrième année, à la faculté de médecine dentaire de l'Université de Montréal.

*\*Casio, modèle C-701, Casio Canada Ltée., Division calculatrice et audio-visuel, 2100 Ellesmere, Toronto, Ont.*

*\*\*Ivory, bleue, épaisseur moyenne «Medium», Miles Inc. Dental Products, 4315 South Lafayette Blvd., South Bend, Indiana 46614, U.S.A.*

*\*\*\*Ivory, Miles Inc. Dental Products, 4315 South Lafayette Blvd., South Bend, Indiana 46614, U.S.A.*

### Remerciements

Les auteurs tiennent à remercier Mr. Richard Tanguay pour son aide dans les statistiques.

*Le Dr Haig Baltadjian est un professeur agrégé à la faculté de médecine dentaire, Université de Montréal.*

*Sahag Mahseredjian et un étudiant de quatrième*

*année à la faculté de médecine dentaire, Université de Montréal.*

*Les demandes des tirés-à-part peuvent être adressées à: Dr Haig Baltadjian, Faculté de médecine dentaire, Université de Montréal, C.P. 6128, Succ. «A» Montréal, Québec H3C 3J7.*

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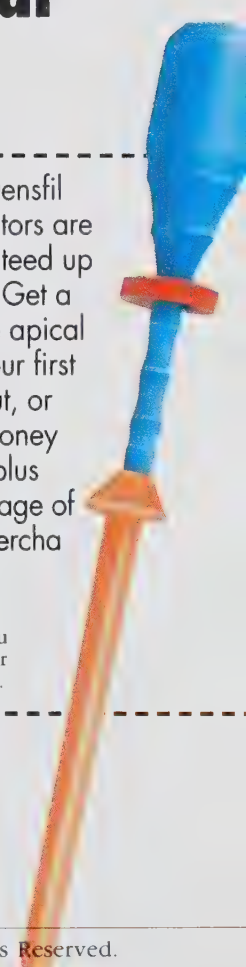
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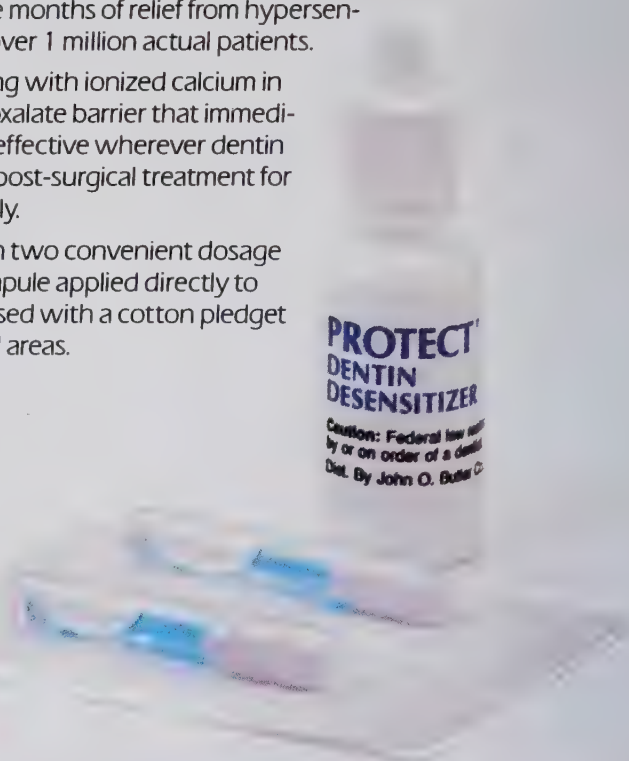
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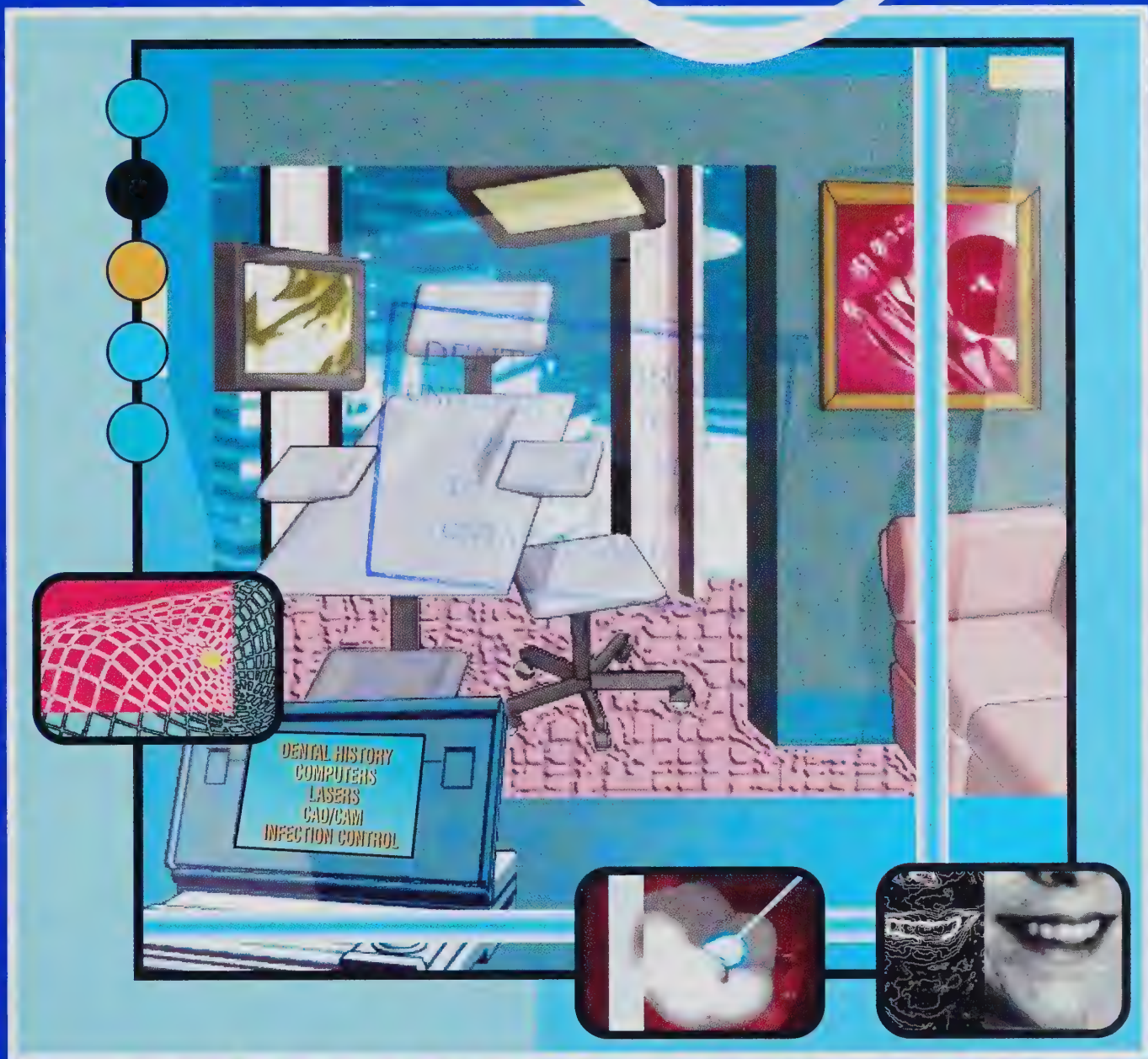
# JOURNAL

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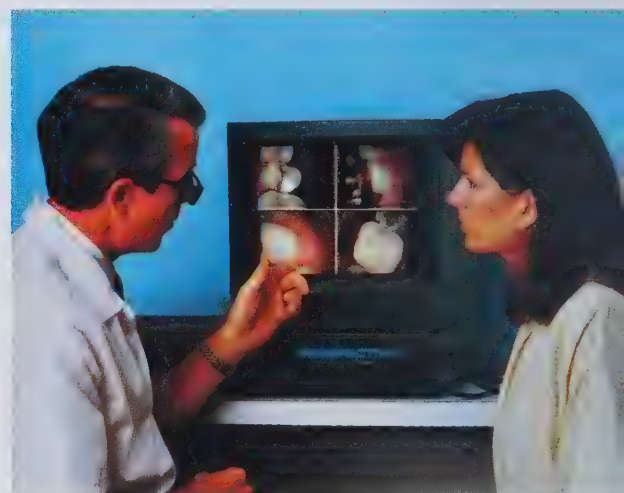
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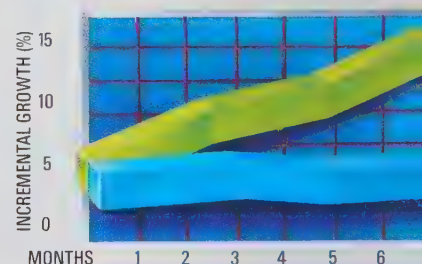
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## DENTISTRY IN THE 21st CENTURY

It is difficult, today, to imagine what life will be like just 30 years from now. The world is in a state of flux, with entire countries collapsing and new nations coming into being almost over night. The Soviet Union is no more. Yugoslavia has been torn asunder. Germany has been reunited. And the list goes on.

But crystal ball gazing can be a valuable exercise. If we can predict the future, we can also plan strategies to meet the challenges that lie ahead. Let's give it a try. The year is 2025, and this poor old editor is almost 100 years old. He is at his desk, looking back over the past three decades...

Canada eventually solved its constitutional problems and now lives in relative peace with its rich heritage. The country is no longer bilingual but multilingual. Twelve million immigrants, mostly from Asia and Africa, have raised our population to more than 40 million.

Peace in the world? Not really. The haves and the have-nots, the rich and the poor, the generous and the greedy, the kind and the wicked still inhabit the earth. Despite all the advances in technology, human nature hasn't changed that much – people of free spirit can still make wrong choices.

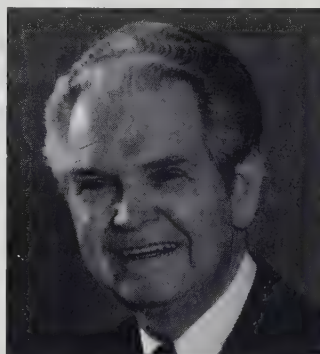
Of dentistry? Oh, the changes! I remember the day when the belt-driven dental engine of the '50s was replaced by the Borden air rotor. But we don't see many dental drills these days, nor very much local anesthetic. Almost all hard and soft tissue cutting is now done by laser.

Computer-assisted design and manufacturing (CAD/CAM) has made restorative dentistry so much simpler. I still find it hard to imagine a full crown being prepared and cemented in 30 minutes. How well I remember the hours of hard work – drilling, retraction, impressions, temporaries, labs and multiple appointments – that this procedure involved when I was in practice.

Today, computer-assisted devices are an integral part of everything we do in dentistry. Voice activated charting, periodontal probing, imaging, and occlusal analysis contribute so much to our efficiency and accuracy. And we can certainly be thankful that 35 years ago CDA led world dentistry with the introduction of electronic data interchange (CDAnet).

We still see the odd silver amalgam in the mouths of some older patients. The CAD/CAM ceramics and titanium of today seem more biologically compatible, but there is rising concern about the health effects of plastic composites placed before the turn of the century.

AIDS – the scourge of the 1990s – seems like a dream now. A team of Canadian researchers won the



*Dr. Ralph Crawford*

Nobel Prize for developing an AIDS vaccine in 2003. But more than 50 million people worldwide contracted AIDS before the vaccine was developed, and there is still no known cure for this terrible disease.

Speaking of vaccines, our researchers have yet to perfect a vaccine, or find a cure, for periodontal disease and caries. I believe it's just a matter of economics. Unlike AIDS, neither tooth decay nor gum disease are fatal, so they aren't a priority for research funds.

The finance minister brought down the budget for the fiscal year 2025-26 recently, and research funds seem as scarce now as they were 30 years ago. The minister seemed pleased that next year's deficit will be only \$42 billion. Canada's aging population is causing a severe taxation problem. There are fewer and fewer workers – even with the influx of new immigrants – to support the now retired baby boom generation.

Old timers like me, who graduated in the 1960s, still talk of the "Golden Years" that dentistry experienced 50 years ago. Today there are only seven dental colleges in Canada – three dental faculties were closed during the 1990s – and it seems strange that we aren't graduating more dentists in 2025 than we did in 1995. But, then, isn't that what dentistry is all about – the elimination of dental disease?

There are still many oral health problems in society despite our sophisticated, computerized practice techniques. The waves of immigrants who came to Canada from Third World countries had little or no access to dental care in their native lands (they're making up for that neglect now) and the aging population – 31 per cent of Canadians are over 75 – also requires special consideration.

In 2002, when the Canadian Dental Association celebrated its centenary, many dentists expressed grave concerns about its future. Half of the provinces had opted for voluntary CDA status and membership in the association had dropped dramatically. Fortunately common sense and hard realities pointed the way.

Despite computers, CAD/CAM and lasers, communication is still at the heart of professional survival. And only an authoritative, unified, national voice – speaking for all dentists in Canada – can provide that essential ingredient. I guess that's why CDA survived past 2002, and why it will be around 100 years from now...

*P. Ralph Crawford, BA, DMD  
Editor, Journal of the Canadian Dental Association*



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Since Toradol is not a controlled substance,<sup>2</sup> there's no need to worry about narcotic control or security procedures. As well, Toradol has no narcotic prescribing restrictions.

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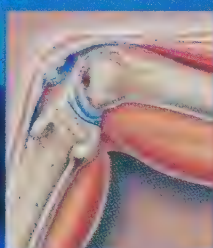
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### THERAPEUTIC CLASSIFICATION

Analgesic Agent

### ACTION

Toradol (ketorolac tromethamine) is a non-steroidal anti-inflammatory drug that exhibits analgesic activity. Its mode of action is to inhibit the cyclo-oxygenase enzyme system, thereby inhibiting the synthesis of prostaglandins, and is considered to be a peripherally acting analgesic. At analgesic doses it has minimal anti-inflammatory and antipyretic activity.

Ketorolac tromethamine is rapidly and completely absorbed when administered by both the oral and intramuscular routes, and pharmacokinetics are linear following single and multiple dosing.

Steady state plasma levels are attained after one day of Q.I.D. dosing. Based only on pharmacokinetic principles, a faster attainment of the steady state plasma level might be achieved with a loading dose of about twice the maintenance dose. This occurs when the dosing interval is approximately equal to the drug's half-life.

Following oral administration, peak plasma concentrations of 0.52 to 1.31 mcg/ml occurred 35 minutes after a single 10 mg dose. The terminal plasma elimination half-life ranged between 4.1 and 6.1 hours in healthy adults, while in elderly subjects (mean age: 72 years) it ranged between 3.0 and 6.1 hours. A high fat diet decreased the rate but not the extent of absorption of oral ketorolac tromethamine, while antacid had no effect.

Following intramuscular administration, peak plasma concentrations of 2.2 to 3.0 mcg/ml occurred an average of 50 minutes after a single 30 mg dose. The terminal plasma half-life ranged between 3.8 and 6.3 hours in young adults and between 4.4 and 8.6 hours in elderly subjects (mean age: 72).

The primary route of excretion of ketorolac tromethamine and its metabolites (conjugates and the p-hydroxy metabolite) is in the urine (91.4%) and the remainder is excreted in the feces.

More than 99% of the ketorolac in plasma is protein bound over a wide concentration range.

### INDICATIONS

Orally administered Toradol (ketorolac tromethamine) is indicated for the short-term management of mild to moderately severe pain, including post-surgical pain (such as general, orthopedic and dental surgery), acute musculoskeletal trauma pain and post-partum uterine cramping pain.

Intramuscular injection of Toradol is indicated for the short-term management of moderate to severe pain, including pain following major abdominal, orthopedic and gynecological operative procedures.

### CONTRAINDICATIONS

Toradol (ketorolac tromethamine) should not be used where there is a known or suspected hypersensitivity to the drug. Because of the possibility of cross-sensitivity, ketorolac tromethamine should not be used in patients in whom acetylsalicylic acid (ASA) or other non-steroidal anti-inflammatory agents induce acute asthmatic attacks, urticaria, rhinitis or other allergic manifestations. Fatal anaphylactoid reactions may occur in such individuals.

Toradol (ketorolac tromethamine) also should not be used in patients with peptic ulcer or active inflammatory disease of the gastrointestinal system.

### WARNINGS

Long-term administration of ketorolac tromethamine oral formulation has shown that this drug shares the risks that other non-steroidal anti-inflammatory drugs pose to patients when taken chronically. Peptic ulceration, perforation and gastrointestinal bleeding, sometimes severe and occasionally fatal have been reported during therapy with non-steroidal anti-inflammatory drugs and may occur with ketorolac tromethamine, both in the presence or absence of previous symptoms. Elderly and debilitated individuals are most susceptible to these complications, the incidence of which increases with dose and duration of treatment. Close medical supervision is recommended in patients prone to gastrointestinal tract irritation, particularly those with a history of peptic ulcer, diverticulosis or other inflammatory disease of the gastrointestinal tract. In these cases the physician must weigh the benefits of treatment against the possible hazards.

Patients taking any non-steroidal anti-inflammatory drug including ketorolac tromethamine should be instructed to contact a physician immediately if they experience symptoms or signs suggestive of peptic ulceration or gastrointestinal bleeding. These reactions can occur at any time during the treatment. If peptic ulceration is suspected or confirmed, or if gastrointestinal bleeding occurs, ketorolac tromethamine should be discontinued and appropriate treatment instituted and the patient closely monitored.

Ketorolac tromethamine is not recommended for routine use with other non-steroidal anti-inflammatory drugs because of the potential for additive side effects.

**Use in pregnancy, lactation and labour:** The administration of ketorolac tromethamine is not recommended during pregnancy or lactation.

Ketorolac tromethamine is not recommended for use as an obstetrical preoperative medication or for obstetrical analgesia because of the known effects of non-steroidal anti-inflammatory drugs on uterine contraction and fetal circulation.

**Use in children:** Safety and efficacy in children have not been established. Therefore, Toradol is not recommended for use in children under age 16.

**Use in the elderly:** Because ketorolac is cleared somewhat more slowly by the elderly (See PHARMACOKINETICS) who are also more sensitive to the renal effects of non-steroidal anti-inflammatory drugs, extra caution and the lowest effective dose should be used.

### PRECAUTIONS

**Renal effects:** As with other drugs that inhibit prostaglandin biosynthesis, elevations of blood urea nitrogen (BUN) and creatinine have been reported in clinical trials with ketorolac tromethamine. Since ketorolac tromethamine and its metabolites are excreted primarily by the kidney, patients with significant impairment of renal function (serum creatinine values greater than 5 mg/dL) should not receive ketorolac tromethamine unless the expected benefits outweigh the risks. In patients with moderately impaired renal function serum creatinine values ranging from 1.9 to 5.0 mg/dL, the rate of ketorolac clearance was reduced to approximately half of normal. The total daily dose of ketorolac tromethamine should be reduced by half in such patients. The disposition of ketorolac in dialysis patients has not been studied.

Patients who are volume depleted because of blood loss or severe dehydration may be dependent on renal prostaglandin production to maintain renal perfusion and therefore glomerular filtration rate. In such situations the use of drugs which inhibit prostaglandin synthesis might be expected to further decrease renal blood flow. Caution is advised if ketorolac tromethamine is used in such circumstances. Close monitoring of urine output, serum urea and serum creatinine is recommended until the patient is normovolemic.

**Hepatic effects:** Meaningful elevations (greater than 3 times normal) of serum transaminases (glutamate pyruvate (SGPT or ALT) and glutamic oxalacetic (SGOT or AST)) occurred in controlled clinical trials in less than 1% of patients. If clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur (e.g., eosinophilia, rash, etc.), ketorolac tromethamine should be discontinued. Patients with impaired hepatic function from cirrhosis do not have any clinically important changes in ketorolac tromethamine clearance. Studies in patients with active hepatitis or cholestasis have not been performed.

**Fluid and electrolyte balance:** Fluid retention and edema have been observed in patients treated with Toradol. Therefore, as with many other non-steroidal anti-inflammatory drugs, the possibility of precipitating congestive heart failure in elderly patients or those with compromised cardiac function should be borne in mind. Toradol should be used with caution in patients with cardiac decompensation, hypertension or other conditions predisposing to fluid retention.

**Hematologic effects:** Ketorolac tromethamine inhibits platelet function and may prolong bleeding time. It does not affect platelet count, prothrombin time (PT) or partial thromboplastin time (PTT). Patients who have coagulation disorders or are receiving drug therapy that interferes with hemostasis should be carefully observed when ketorolac tromethamine is administered. Unlike the prolonged effects from aspirin, the inhibition of platelet function by ketorolac tromethamine is normalized within 24 to 48 hours after the drug is discontinued.

Blood dyscrasias associated with the use of non-steroidal anti-inflammatory drugs are rare, but could occur with severe consequences.

**Infection:** In common with other anti-inflammatory drugs, ketorolac tromethamine may mask the usual signs of infection.

**Drug interactions:** Toradol (ketorolac tromethamine) is highly bound to human plasma protein (mean 99.2%) and binding is independent of concentration.

Prothrombin time should be carefully monitored in all patients receiving oral anticoagulant therapy concomitantly with ketorolac tromethamine.

Ketorolac tromethamine does not alter digoxin protein binding.

In vitro studies indicated that at therapeutic concentrations of salicylates (300 mcg/mL), the binding of ketorolac tromethamine was reduced from approximately 99.2% to 97.5%. Therapeutic concentrations of digoxin, warfarin, acetaminophen, phenytoin, tolbutamide and piroxicam did not alter ketorolac tromethamine protein binding. Since ketorolac tromethamine is a highly potent drug and present in low concentrations in plasma, it would not be expected to displace other protein-bound drugs significantly.

There is no evidence in animal or human studies that ketorolac tromethamine induces or inhibits the hepatic enzymes capable of metabolizing itself or other drugs. Hence, it would not be expected to alter the pharmacokinetics of other drugs due to enzyme induction or inhibition mechanisms.

Ketorolac tromethamine mildly reduces the diuretic response to furosemide in normovolemic subjects. Inhibition of renal lithium clearance leading to an increase in plasma lithium concentration and potential lithium toxicity has been reported with some non-steroidal anti-inflammatory drugs. The effect of ketorolac tromethamine on lithium plasma levels has not been studied.

Concomitant administration of methotrexate and some non-steroidal anti-inflammatory drugs have been reported to reduce the clearance of methotrexate, enhancing the toxicity of methotrexate. The effect of ketorolac tromethamine on methotrexate clearance has not been studied.

There is limited experience on concurrent administration with morphine. Available information shows no evidence of adverse interactions. The extent of a possible narcotic-sparing effect of ketorolac tromethamine is currently under investigation.

### ADVERSE EFFECTS

**Toradol tablets:** The incidence of adverse reactions in approximately 600 patients and subjects receiving short-term oral therapy (less than 2 weeks) with Toradol (ketorolac tromethamine) are listed below. The most common adverse effects include: Gastrointestinal: dyspepsia (2%), gastrointestinal pain (2%), nausea (2%). Central nervous system: headache (2%), dizziness (2%).

The following adverse events are rare but have been reported (less than 1%): Gastrointestinal: flatulence, gastritis. Respiratory: dyspnea. Dermatologic: urticaria, rash, pruritus. Metabolism/nutritional: edema. Body as a whole: asthenia. Hemic and lymphatic: purpura. Musculoskeletal: myalgia.

**Toradol IM:** The adverse reactions listed below were reported to be probably related to Toradol IM in clinical trials in which patients received up to 20 doses of 30 mg of intramuscularly administered Toradol over a period of up to five days.

Incidence between 3 and 9%: Gastrointestinal: nausea, dyspepsia, gastrointestinal pain. Central nervous system: drowsiness. Incidence between 1 and 3%: Gastrointestinal: diarrhea. Central nervous system: dizziness, headache, sweating. Body as a whole: edema. Injection site pain was reported by 2% of patients in multi-dose studies (vs. 5% for morphine control group).

Incidence 1% or less: Gastrointestinal: constipation, flatulence, gastrointestinal fullness, liver function abnormalities, melena, peptic ulcer, rectal bleeding, stomatitis, vomiting. Body as a whole: asthenia, myalgia. Cardiovascular: vasodilatation, pallor. Hemic and lymphatic: purpura. Nervous system: dry mouth, nervousness, paresthesia, abnormal thinking, depression, euphoria, excessive thirst, inability to concentrate, insomnia, stimulation, vertigo. Respiratory: dyspnea, asthma. Urogenital: increased urinary frequency, oliguria. Dermatologic: pruritus, urticaria. Special senses: abnormal taste, abnormal vision.

### OVERDOSAGE

The absence of experience with acute overdosage precludes characterization of sequelae and assessment of antidotal efficacy at this time. In a gastroscopic study of healthy subjects, daily doses of 360 mg given over an 8-hour interval for each of five consecutive days (3 times the highest recommended dose) caused abdominal pain and peptic ulcers which recovered after discontinuation of dosing.

### DOSAGE AND ADMINISTRATION

**Adults:** Dosage should be adjusted according to the severity of the pain and the response of the patient.

**Oral:** The usual oral dose of Toradol (ketorolac tromethamine) is 10 mg every 4 to 6 hours for pain as required. Doses exceeding 40 mg per day are not recommended.

Toradol is recommended for short-term use only i.e. for a maximum of a few weeks.

**Parenteral:** The recommended usual initial dose is 30 mg. Subsequent dosing may be 10 mg to 30 mg every 4-6 hours as needed to control pain. A lower initial dose may be suitable for patients under 50 kg in body weight, over age 65 years and/or with less severe pain at baseline. In the initial post-operative period, more frequent dosing (e.g., every 2 hours) may be employed, but the total daily dose should not exceed 120 mg. Dose above 120 mg could cause drug toxicity (see Warnings & Precautions). If supplemental analgesia is required, a concomitant low dose of opiate can be used.

The administration of continuous multiple daily doses of Toradol IM should not exceed 5 days for injection dosing. There has been limited experience with dosing for more than 5 days since the vast majority of patients have transferred to oral medication or no longer required analgesic therapy after this time.

**Directions for use:** Insert the plunger into the syringe barrel and thread it onto the screw. WITHOUT REMOVING THE NEEDLE GUARD, apply quick, firm pressure to the plunger to break the inner seal (you will feel it let go). Pull back on the plunger slightly to relieve pressure. Remove the needle guard by twisting as you pull. Use the unit as you would a normal syringe. Dispose of properly.

### CONVERSION FROM PARENTERAL TO ORAL THERAPY

Toradol tablets may be used either as monotherapy or as follow-on therapy to parenteral ketorolac. In the latter case, the total combined daily dose of ketorolac should not exceed 120 mg on the day the change of formulation is made, this includes a maximum of 4 of the 10 mg tablets.

Toradol (ketorolac tromethamine) is a Schedule F drug.

### COMPOSITION

**Toradol Tablets:** Each Toradol tablet contains ketorolac tromethamine, the active ingredient, with microcrystalline cellulose, lactose and magnesium stearate. The coating suspension contains hydroxy-propyl-methylcellulose, titanium dioxide and polyethylene glycol.

**Toradol IM:** Toradol IM is available for intramuscular administration as: 15 mg in 1 mL (1.5%), or 30 mg in 1 mL (3%) of ketorolac tromethamine in sterile solution. The 15 mg/mL solution contains 10% (w/v) alcohol, USP, and 6.8 mg sodium chloride in sterile water. The 30 mg/mL solution contains 10% (w/v) alcohol, USP and 4.35 mg sodium chloride in sterile water. The pH is adjusted with sodium hydroxide or hydrochloric acid. The sterile solutions are clear and slightly yellow in colour.

### STABILITY AND STORAGE RECOMMENDATIONS

**Toradol Tablets:** Store at room temperature. The blister package tablets should be protected from light.

**Toradol IM:** Store at room temperature with protection from light.

### AVAILABILITY OF DOSAGE FORMS

Toradol (ketorolac tromethamine) is available as 10 mg white round film coated tablets with one side printed in red with TORADOL inside a bold T and the other side with Syntex. Toradol (ketorolac tromethamine) 10 mg tablets are available in bottles of 100 and 500 tablets.

Toradol IM is available in 1 mL syringes containing 15 or 30 mg/mL of ketorolac tromethamine.

Product Monograph available on request.

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Toll-free Toradol Information Hotline: 1-800-561-5481.



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The Upjohn Company of Canada  
 Don Mills, Ontario



# President's Column

## TEAMWORK

The preamble to CDA's revised *Code of Ethics* contains a very simple message: "A dentist's foremost responsibility is to the patient." It seems so obvious. The dental profession – as a whole – exists to provide optimum oral health care to the public. Nothing more, nothing less.

In today's world, however, more and more people are espousing a "me first" philosophy. This trend is evident at every level of society, from the highest to the lowest. It's seen among professionals, politicians, union leaders and members of the public. And it's tearing us apart.

Take the current constitutional debate, for example. No one is really talking about the future of Canada. Instead, interest groups push individual causes, and the provinces vie for ever-increasing powers.

It's up to all of us to ensure that a similar crisis never occurs in the dental profession. We must continue to put the patient first, regardless of what our own interests or aspirations might be.

For close to three decades, dental hygienists have been key players in our efforts to provide optimum oral health care to all Canadians. Dentists and allied dental personnel have worked together as a team, achieving professional excellence through cooperation and unity.

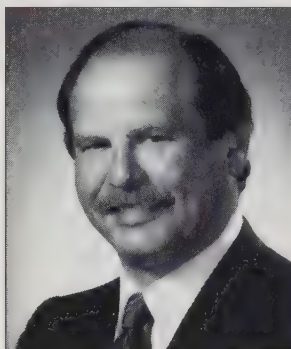
It's important for all of us to recognize how much allied dental personnel have contributed to the profession. These dedicated people provide a wide range of vital services to our patients.

Unfortunately, the partnership between Canadian dentists and dental hygienists is now showing some wear around the edges. Across the country, in the various provincial jurisdictions, representatives of the dental hygienists are seeking various forms of autonomy. The most extreme position would see dental hygienists setting up independent offices, outside of the supervision of a dentist.

The dental hygienists' desire for more independence is only natural. Everyone feels a need to grow, to expand their horizons. But as members of the dental profession, it is inherent on all of us to look beyond our personal aspirations to the well-being of the patients we serve.

It is unclear whether the current call for independence represents the views of a small group of vocal individuals or those of a majority of Canadian dental hygienists. I would like to see Canada's dental hygienists work together to develop a unified position, so that a true picture of their needs and desires would become clear to all of us.

The ensuing deliberations would focus on ex-



Dr. Les Allen

tremely complex issues. If we are to achieve a fair, reasonable solution, everyone concerned must be allowed to participate in the debate, and they must do so in an honest, open manner. But above all, everyone must put the needs of the patient above their personal goals.

Over the last 18 months, Dr. Kevin Roach, a past-president of CDA, has worked closely with the Canadian Dental Hygienists' Association (CDHA) to develop a position statement on supervision requirements for dental hygienists.

This statement is intended as a resource

not only for oral health care teams, but also for other groups involved in defining and rationalizing the roles, responsibilities and working relationships of all types of health care personnel. It identifies the individual responsibilities of dentists and dental hygienists, and is designed to revitalize and more clearly define their working relationship.

CDA has shown a willingness to collaborate on the wording of the statement and has listened carefully to the dental hygienists' concerns. We have worked hard to achieve consensus on a joint statement, one that meets the goals and aspirations of both dentists and dental hygienists. But throughout this process, CDA has put the interests of patients first. Their well-being must take precedence over our desire to reach agreement on the independence issue, and it has.

Unfortunately, CDHA refused to endorse the statement that was developed through these discussions. The dental hygienists' association believed, said Dr. Roach, that "The statement was not futuristic or visionary enough (at this time) to be used in negotiations with the licensing authorities and various political organizations, while advancing their cause."

We have reached an impasse. CDA believes that dentists alone have the education and training required to make a differential diagnosis, manage patient care and delegate suitable procedures to qualified personnel, as defined by the appropriate dental licensing authority.

Notwithstanding the desire of some dental hygienists for more independence, this important principle must be maintained. It, and it alone, ensures that dentists remain responsible for managing their patients' oral health care needs, allowing them to discharge their foremost responsibility – their responsibility to the patient.

Les Allen, B. Comm., DMD  
President of the Canadian Dental Association



# A Year of Celebration

## Sir William Osler

One hundred years ago, in 1892, Dr. William Osler published *The Principles and Practice of Medicine*. It was a landmark guide for the development of modern hospital design and medical practice.

Dr. Osler was born in Bond Head, Ontario, on July 12, 1849. He attended Trinity College in Toronto, and then studied medicine at McGill University in Montreal, earning his degree in 1872.

After undertaking graduate work in London, Leipzig and Vienna, Dr. Osler was appointed as a professor of medicine at McGill in 1874. He subsequently moved to the United States, and from 1889 to 1904 he was a professor of medicine at John Hopkins University.

Created a baronet in 1911, Sir William carried out original and valuable research on the diseases of the spleen and blood, as well as making eminent contributions to the study of infections of the heart, angina pectoris, malaria and many minor maladies.

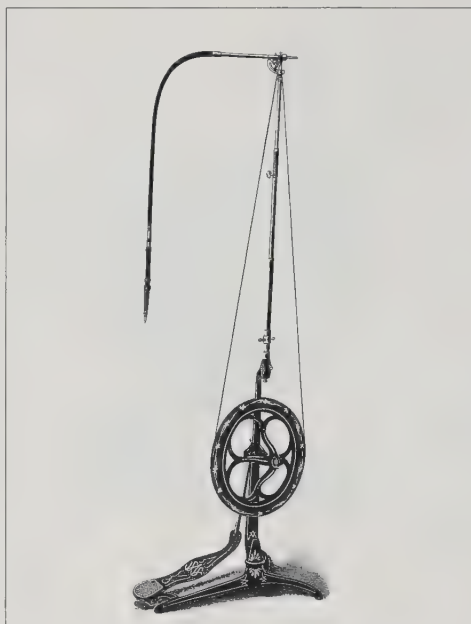
Dr. Osler possessed a rare gift of expression, which he used on many occasions. However, his most touching remarks were perhaps given during a farewell dinner in New York, just before he embarked for Oxford University to serve as regius professor of medicine:

*"I have three personal ideals. One, to do the day's work well and not to bother about tomorrow... The second ideal has been to act the Golden Rule, as far as in me lay, toward my professional brethren and toward the patients committed to my care. And the third has been to cultivate such a measure of equanimity as would enable me to bear success with humility, the affection of my friends without pride, and to be ready when the day of sorrow and grief came to meet it with the courage befitting a man."*

## The Dental Engine

Since the time of Pierre Fauchard, dentists have tried to find a suitable drill to cut tooth structure. Early endeavors involved the ring drill of Amos Westcott (1846) and the clumsy clockwork mechanisms brought out in England in the 1860s.

It wasn't until 1871 that James Beall Morrison, borrowing on Singer's treadle sewing machine concept, developed the first foot-treadle dental engine. In 1872, the S.S. White Company improved on Morrison's design by incorporating a flexible cable. Eleven years later, the same firm introduced the first electric engine for dentistry, which was connected to the drill by a flexible shaft.



Dr. William Bonwill of Philadelphia was the first dentist to successfully operate a dental engine with a continuous cord system and compensating joints. His concept led S.S. White to patent the first commercial cord-driven engine in 1883.

## Dr. Frank Demille Price

A century ago, in 1892, Dr. Frank Price graduated from the Royal College of Dental Surgeons of Ontario (RCDS). One of a family of 12, he was born on a farm near Napanee, Ontario, and was to become one of Canada's outstanding dental innovators.

During his undergraduate days, Dr. Price became intensely interested in the development of new uses for electricity. Even at this early stage in his career he contributed significantly to the field of electrotherapeutics. Within a year of Roentgen's discovery of X-rays in 1895, Dr. Price had built the first X-ray machine manufactured in Canada.

A few years later, while on staff at RCDS in Toronto, Dr. Price manufactured numerous electrical dental devices. Many of these – controlled heaters for air, water and wax, and electric cauteries and sterilizers – were forerunners of the devices found in modern dental offices.

Together with his brother, who was in the manufacturing business, Dr. Price also devised a process of adding lead salts to rubber to make protective aprons and gloves for X-ray operators.

## Dr. John Hunter — (1728-1793)

Last month, Dr. Michael Newman, a

Winnipeg neurologist, donated a beautiful bound reproduction of John Hunter's monumental book, *Natural History of Human Teeth*, to the Museum of the Canadian Dental Association. Checking the text's publication date, 1771, was a reminder that next year will be the 200th anniversary of the death of the greatest surgeon of the 18th century.

Hunter, the youngest of 10 children, was born near Glasgow, Scotland. His father died when he was only 13, and young John received a very rudimentary education. It was only by extreme perseverance that he entered the medical profession and eventually became associated with some of London's most famous dentists.

*Natural History of Human Teeth* was his first major work and received immediate acclaim. It was translated into the major languages of the day and became the leading treatise on dentistry for many years.

Hunter's book is outstanding for its exceptionally accurate diagrams, and many of his descriptions hold true to this day. His understanding of the growth and development of the jaws and muscles of mastication were incredibly accurate, and it was Hunter who coined the terms: incisors, cuspids and bicusps. He was the first to disapprove of extracting primary teeth to permit the permanent teeth to erupt.



It was Hunter who determined that enamel has no circulation, and that dentin was vascular before it calcified. He also maintained that teeth do not grow throughout life, but that an extruded tooth only appears to grow longer because its antagonist is lost.



# Les journées dentaires

## Focus on the Dental Team

**F**ocus on the Dental Team has been selected as this year's theme for Les Journées dentaires du Québec.

Canada's largest dental convention and North America's 11th largest, it will be held at the Montreal Convention Centre from May 3-7, 1992, which coincides with the launching of Montreal's 350th anniversary celebrations.

This will be the 21st annual meeting of Les Journées dentaires du Québec. The planning committee has assembled a comprehensive five-day meeting highlighted by established national and international speakers.

An expanded program, with participation courses and lecturers, as well as live television presentations and panels will enable the dentist and his team to learn and be better prepared to face the challenges of the '90s.

The pre-convention program, to be held Sunday, May 3, and Monday, May 4, features high-calibre lectures and participation courses. Separate registration fees are required for these presentations.

### Pre-Convention Sessions

The pre-convention English program will feature a two-day hands-on seminar on "prosthetic advances in osseointegration," presented by Dr. Torsten Jemt of Sweden. It is an advanced course on the latest innovations for restoring partially edentulous jaws with implants. Also on Sunday, Pat Shannon from Dallas, Texas, will present a lecture on "image development and communication." The French program will feature Dr. Alain Lacan from Paris, France. French-language lectures will also be presented on "posterior tooth adhesive restorations," Dr. André Prévost; and "esthetic considerations in periodontics," Dr. Elise Shoghikian. In addition, Dr. Josée-Anne Dulude will conduct a participation course on "interceptive orthodontics."

Monday's sessions will include Linda L. Miles from Virginia, speaking on "dynamic practice management," and a lecture on "clinical and laboratory features of esthetic bonded restorations," presented by Dr. George Tysowsky and Mr. Lee Culp. Hands-on courses in French feature Dr. Pierre Boudrias, on "temporary restorations in fixed prosthodontics," and Dr. Denis Robert, on "pre-fabricated posts and metallic pins." Drs. Maurice Bourassa and Clem-

350 YEARS  
MONTRÉAL  
let's celebrate



ent Leclerc round off the pre-convention session with a live, televised presentation on "hypnosis in the dental office."

The convention itself, including the technical exhibits, will take place from Tuesday, May 5, to Thursday, May 7. All out-of-province dentists will be offered a registration fee of \$150 (plus GST), which includes three lunches, a social evening, and access to the exhibits and scientific sessions.

### Convention Sessions

The convention begins on Tuesday with French and English presentations. The English program includes presentations by Dr. Albert Goerig on "endodontics," Dr. Ron Nevins on "periodontics and restorative dentistry," Dr. Dale Miles on "improving your image - radiographically," and Dr. Lonnie Carton on "getting a grip on your life." Tuesday's French lectures will be on "new developments in computers," "methodical approach to esthetics in fixed prosthodontics," "oral surgery," "TMJ disorders and bruxism," "plastic surgery and management of dental infections." In addition, a discussion panel on "AIDS" and a live, televised presentation on "periodontal surgery" and "hybrid prostheses and implants" are planned.

Wednesday's English program will feature Dr. Frank Spear, on "restorative periodontics for the compromised dentition," Dr. Dale Miles, on "oro-facial pain," Dr. Perry Goldberg, on "prosthodontics and implants," Dr. Myron Allukian, on "public health dentistry," Dr. Peter Stutman, on "the three-unit fixed bridge," and Brian Payne, on "CPR."

French presentations will be on "regenerative periodontics," by Dr. Roger Issa, "first aid," by Tony d'Amicantonio, "esthetics in fixed prosthodontics," by Dr. Gérard Chiche, "glass ionomer cements," by Dr.

Pierre Desautels, "pre-prosthetic surgery," by Dr. Paul Mercier and a live broadcast on "ideal posture and positioning while working," by Dr. André Chartrand. Also on Wednesday, a "self-defense" class will be given by Sensei Wayne Donovan.

Featured on Thursday, the final day of the convention, are English lectures on "occlusion," by Dr. Irwin Becker of the Pankey Institute, "working women and stress," by Sharyn Seppinwall, and "recent advances on bonded materials to dentin," by John Gwynett. French lectures will deal with topics such as: "home bleaching," by Dr. Pierre de Grandmont, "communication," by Raymond Forget, "reasons for failures in complete dentures," by Dr. G. Gauthier, and "endodontic failures," by Dr. Salam Sakkal.

### Social Events

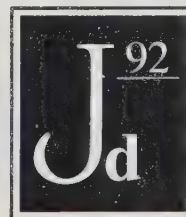
A spouses' program has been organized that will include tours of the city of Montreal, as well as the main attractions of the city's 350th anniversary celebrations. On Wednesday evening, convention participants are invited to an informal evening of dancing to live music, with the festivities to continue into the early hours of the morning.

### Technical Exhibits

During the convention, more than 320 technical exhibits will highlight the latest in dental materials and equipment. This will enable dentists and their staff to save considerable time in updating their office inventory. There will also be many valuable draws and door prizes for visitors to the exhibit area.

For a preliminary program and a tourist guide of Montreal, please contact:

Les Journées dentaires du Québec  
625, René-Lévesque West  
5th floor  
Montreal, Québec  
H3B 1R2  
Tel: (514) 875-8511





# Announcements

## NATIONAL HIGHLIGHTS

**May 3-7, 1992**  
Les journées dentaires  
(514) 875-8511

**May 13-15, 1992**  
ODA Spring Meeting  
(125th Anniversary)  
Toronto, Ontario  
(416) 922-3900

**May 29-30, 1992**  
Dental Association of PEI  
Annual Meeting  
(902) 894-4022

**May 30, 1992**  
New Brunswick Dental Society  
(506) 452-8575

**June 4-7, 1992**  
College of Dental Surgeons  
of Saskatchewan Annual  
Convention  
(306) 244-2476

**June 18-20, 1992**  
Newfoundland Dental Association  
(709) 579-2362

**August 28-30, 1992**  
44th Annual Scientific Session  
Canadian Association  
of Orthodontists  
Calgary, Alberta  
(416) 491-3186

**August 29-September 2**  
1992 Canadian Dental Association  
Annual Convention  
Calgary, Alberta  
Christine Leadman  
(613) 523-1770  
(outside Canada)  
1-800-267-6364 (East)  
1-800-267-6354 (West)

Diagnosis and Management of Infection in the Immunocompromised Host, being held at the Catamaran Resort Hotel in San Diego, California. For more information, contact: Dr. R.B. Abrams, The Children's Hospital, 1056 East 19th Ave., Denver, Colorado, 80218, or call: (303) 861-6788.

**August 7-10: 3rd Singapore International Dental Exhibition & Conference** in Singapore. For more details, contact: SIDEC 92, Orchard Dental Centre Pte Ltd., 268 Orchard Rd, #05-07, Singapore 0923.

**August 9-14: 70th Annual Dental Association of South Africa Congress** in Sun City, South Africa. For information, contact: Helmut Heydt, DASA Congress, Private Bag 1, Houghton 2041, South Africa.

**August 20-25: Canadian Society of Forensic Science Annual Conference** will be held in Halifax, Nova Scotia. For more information, contact: Fredricka Monti, Canadian Society of Forensic Science, Suite 215, 2660 Southvale Crescent, Ottawa, Ontario, K1B 4W5 or call: (613) 731-2096.

## May/Mai 1992

**May 1-3: Academy of Sports Dentistry** meeting being held in Hartford, Connecticut. For information, contact: Dr. A.W.S. Wood, 1553 Randor Dr., Mississauga, Ontario, L5J 3C6. Tel: (416) 823-2008.

**May 7-8: Association Internationale Francophone de Recherche Odontologique 9th Colloquium** will be held at the University of Montreal in Montreal. For details, contact: Dr. Daniel Grenier, secretary of AIFRO, Faculté de Médecine Dentaire, Université de Montréal, Montréal, Québec. Tel: (514) 343-2385.

**May 9-13: 46th Annual Meeting of the American Academy of Oral Pathology** in San Francisco, California. For information, contact: Dr. John M. Wright, Secretary Treasurer, American Academy of Oral Pathology, Baylor College of Dentistry, 3302 Gaston Ave, Dallas, Texas 75246. Tel: (214) 828-8110.

**May 10-13: Annual Conference of the Canadian Long Term Care Association** in Winnipeg, Manitoba. Inquiries contact: Mary Peterson Elias, Continuing Education Division, University of Manitoba, Winnipeg, Manitoba, R3T 2N2. Tel: (204) 474-9923.

**May 14: University Class of '67 Reunion** celebrating 25th year in the main ballroom of the Admiral Hotel in Toronto. For more details, contact: M. Naiberg, 8199 Yonge St., Suite 404, Thornhill, Ontario. Tel: (416) 889-0810.

**May 23-30: Travel and Learn Cruise to Alaska** departing from Vancouver, British Columbia on the Regal Princess. Contact: University of British Columbia, Continuing Dental Education, 105-2194 Health Sciences Mall, Vancouver, BC, V6T 1Z3. Tel: (604) 822-2627.

## June/Juin 1992

**June 13-20: Bermuda Dental Association Convention** in Paget, Bermuda. Limited attendance, for more information, contact: Lynne Brandon, CDA, CDR (519) 657-4306 or Jerry Sheppard (519) 434-1647.

## July/Juillet 1992

**July 1-4: 12th International Symposium on Dental Hygiene the Hague** will be held at the Netherlands Congress Centre in The Hague. For more information contact: Secretariat, Vam Namen & Westerlaken Congress Organization Services, "Dental Hygiene Symposium," PO Box 1558, 6501 BN Nijmegen, the Netherlands.

**July 9-11: 3rd Annual Convention of the Atlantic Provinces Academy of General Dentistry** being held at the Digby Pines, Nova Scotia. For information, contact: Dr. Garry Condon (902) 678-7530.

## August/Août 1992

**August 7-9: 7th Annual Meeting of the International Society of Oral Oncology** on

## October/Octobre 1992

**October 14-17: 2nd Annual Meeting of the Bulgarian Dental Association** will be held in Plovdiv and will be jointly organized with the Quintessence Publishing Group. For more information contact: Dr. J. Mihailov, Director, the Bulgarian Dental Association, 1000 Sofia, 34-A Bulgaria Ave., Bulgaria.

**October 28-31: 1st International Congress of the Turkish Society of Restorative Dentistry** will be held in Antalya, Turkey, at the Antalya Sheraton Voyager. For more information write: Dr. Fatma Koray, Faculty of Dentistry, University of Istanbul, 34390 Capa, Istanbul, Turkey.

**October 30-31: Craniofacial Development and Anomalies Conference** will be held at the University of Alberta. For information contact: Dr. G.H. Sperber, Department of Oral Biology, University of Alberta, Edmonton, Alberta, T6G 2N8 or call: (403) 492-1624.

It Pays



to Join  
CDA



# News Update

## Canada Meets Barbados

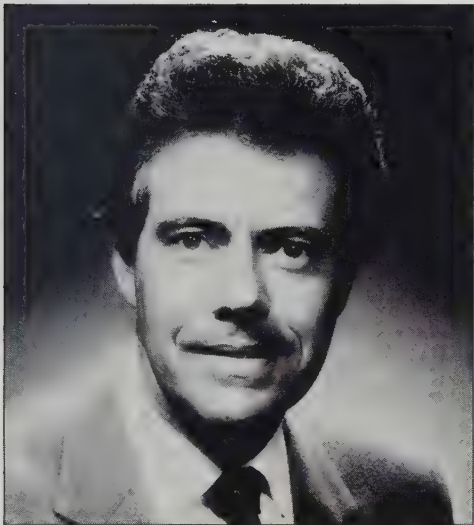
Forty-seven Canadian dentists mixed the sun and surf of the Barbados with continuing education during the annual meeting of the Barbados Dental Association February 10-15.

The week-long meeting, which served as the kickoff for the island's Dental Health Week, featured presentations by Professor Altshuler, Boston; Anita Jupp, Burlington, Ontario; and Dr. David Wood, London, Ontario.

One of the highlights was the presentation of prizes to the winners of the Dental Health Week poster contest, which was split into three categories. The contest, sponsored by Colgate, attracted entries from 1,274 school children. This year's contest theme was, "Brush Every Day, Keep Cavities at Bay."

The Canadian contingent was put together by Lynne Brandon, president-elect of the Ontario Nurses Association.

## Dr. Craig Naylor, CARD President



*Dr. Craig Naylor*

Dr. Craig Naylor, a prosthodontist from Vancouver, B.C., has been elected president of the Canadian Academy of Restorative Dentistry (CARD) for the 1991-92 term.

The year will be a historic one for the new president as he will play a key role in the amalgamation of CARD with the Canadian Academy of Prosthodontics. On September 25-26, the two academies will hold a joint meeting in Montreal.



*Posing for the camera during a reception at the Barbados Dental Association, left to right: Dr. David Wood, London, Ontario; Dr. Derek Golding, Barbados convention coordinator; Dr. Bob Brandon and Mrs. Lynne Brandon, London, Ontario; Dr. Ralph Crawford, Ottawa.*



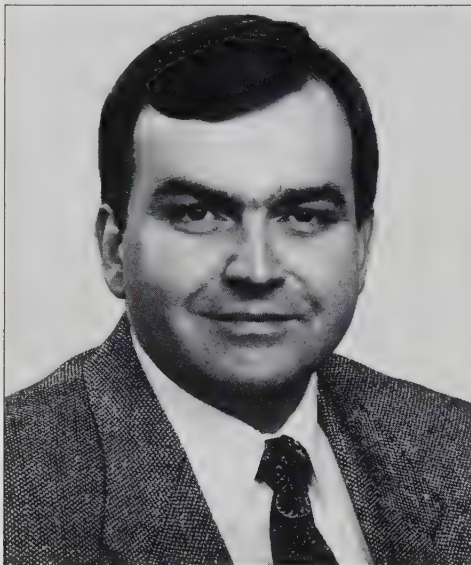
*Holetown, Barbados, proudly proclaims Dental Health Week*



*Mr. Robert More, Colgate's manager in Barbados, presents a prize to one of the younger participants in the Dental Health Week Poster Contest.*



## Dr. Heinz Scherle New Manitoba President



*Dr. Heinz Scherle*

Dr. Heinz Scherle was installed as the president of the Manitoba Dental Association (MDA) during its 108th annual meeting in January.

A 1976 graduate of the University of Manitoba's dental faculty, Dr. Scherle conducts a general dental practice in Selkirk, Manitoba. He was first elected to the MDA board of directors in 1988.

## First World War Dental Officer Dead at 99

Dr. Daniel Young of Winnipeg, the last surviving officer of the Royal Cana-

dian Dental Corps to serve in the First World War, died on February 12, 1992, at the age of 99.

Dr. Young joined the dental corps in 1917, shortly after his graduation from the University of Toronto's dental faculty. He remained in the corp until 1920, and conducted a general practice in Winnipeg, Manitoba, for 46 years.

## CDA Dental Pentathlon Participants Win Gold

Dr. Ernie Slubik, a dentist from Red Deer, Alberta, and dental hygienist Deloris Wood of Willowdale, Ontario, were

"gold medal" winners in the CDA/Bausch & Lomb Dental Pentathlon. Each won an all-expense-paid trip for two to the Winter Olympics in Albertville, France.

Sponsored by CDA and Bausch & Lomb, the Dental Pentathlon was launched during Dental Health Month last year, when every dental office in the country was sent information on how they and their patients could participate in the contest. The dentists and dental hygienists who requested patient educational materials related to the pentathlon were automatically entered in a draw for a trip to the Albertville Winter Games.



*Dr. Ernie Slubik, Red Deer, Alberta, is congratulated by a Bausch & Lomb representative, Mr. Doug Sisson, for winning the Gold Medal prize – an all expense trip for two to the 1992 Winter Olympics in Albertville, France.*



*In April 1990, Dr. Daniel Young received congratulations from Dr. George Johnson, Lieutenant-Governor of Manitoba, upon being awarded an Honorary Membership in the 14th Dental Unit. Dr. Young was the last surviving dental officer from World War One.*

Dr. Slubik and Ms. Wood "won gold" when their names were selected in October 1991. Accompanied by their spouses, Dr. Slubik and Ms. Wood extolled their Olympic experience in Albertville as a once in a lifetime event. When asked if he had enjoyed the trip, Dr. Slubik quickly replied, "Great time would be a gross understatement." Said Ms. Wood, "The highlight for me was watching U.S. figure skater Kristi Yamaguchi skate her way to the Olympic gold medal on February 21."

The CDA/Bausch & Lomb Dental Pentathlon will continue this year, with a "gold medal" winning patient to be selected at the conclusion of Dental Health Month on April 30. Participating dental offices and drug stores have been handing out pentathlon training cards and entry quiz forms since last fall. The lucky winner will again receive an all-expense-paid trip for two to the Olympics – this time to the Summer Games in Barcelona, Spain.



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Thanks to all of our clients who have helped us celebrate our 10th anniversary of service to the Canadian Dental Community.

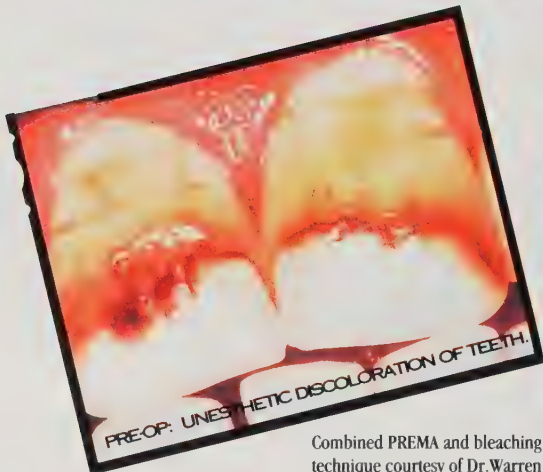
A handwritten signature in black ink, appearing to read 'John DeVries', is written over a horizontal line.

John DeVries  
President-EXAN





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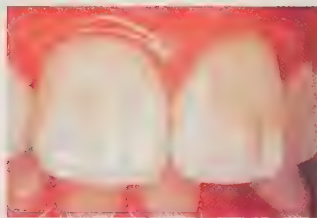


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1. "Enamel microabrasion for removal of superficial dysmineralization and decalcification defects", Croll, T.P., J Am. Dent. Assoc., April, 1990. 2-10, full bibliography available.



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*Dental hygienist Deloris Wood, Willowdale, Ontario, happily accepts her "Gold Medal" trip to the 1992 Winter Games from Mr. Bruce Armstrong, a Bausch & Lomb representative.*

CDA sees its association with Bausch & Lomb as another example of a collaborative effort where everyone is a winner – CDA members, the public and our corporate friends.

## A Sign of the Times?

On Wednesday, March 4, 1992, the following advertisement appeared in the personal column of the Regina Leader-Post:

*Trade 200 bushels of wheat for minor dental work.*

The pathos of this advertisement is not unlike that of an article by Dr. Sylvester Moyer, of Rockglen, Saskatchewan – "The Practice of Dentistry in the Drought Area of the West" – which appeared in the *Journal of the Canadian Dental Association* in March 1935. Here is one paragraph:

*For a country blacksmith's widow, I extracted her teeth and inserted a full upper and lower denture; and in payment received a cow, a calf, and part of a blacksmith's outfit. She was made so attractive that she was able to marry again within a year and a day of the passing of her first husband – bride, groom, and dentist all happy, and no money exchanged hands.*

## Prominent N.B. Dentist Dead

Dr. Philippe F. Cyr of Bathurst, N.B., died February 18, 1992, after a short battle with cancer.



*Dr. Philippe F. Cyr*

A past-president and chairman of the New Brunswick Dental Society, Dr. Cyr was the society's registrar at the time of his death. He graduated from the University of Montreal's dental faculty in 1961.

Throughout his dental career, Dr. Cyr remained dedicated to the concept of organized dentistry and represented his profession on numerous councils and committees at both the provincial and national level. He will be remembered for his community support, which included serving as a board member of the Bathurst School of Nursing and the Higher Education Commission.

Dr. Cyr was a fellow of The Academy of Dentists International and the International College of Dentists and a member of the Pierre Fauchard Academy.

## Geriatric Dentistry Offered at McGill

Faced with a growing number of geriatric patients in Quebec, the faculty of dentistry at McGill University has initiated a bilingual continuing education program in geriatric dentistry.

Approximately 20 Quebec dentists have registered for the unique course – thought to be the first of its kind in Canada.

The program focuses on educating dental practitioners in the treatment of elderly individuals who are institutionalized and have lost some or all of their physical or psychological autonomy. It is made up of two components – 45 hours of theory and 20 hours of clinical practise – and will be administered by Dr. Rita Hurley of McGill University, and Drs. Marcel Tenenbaum and Jean-Robert Vincent, both with the Department of Community Health at Verdun General Hospital. The clinical training

portion of the course will be conducted in neighborhood chronic care hospitals and nursing homes.

Dr. Ralph Barolet, the dean of McGill's dental faculty, said plans are being formulated to offer an abridged version of the course to dental hygienists and nurses in the fall of 1992.

## Obituaries

**Baxendale, Dr. C.J.:** Dr. Baxendale graduated from the University of Toronto in 1930. He was a life member of the Canadian Dental Association.

**Dick, Dr. J.:** Dr. Dick graduated from the University of Toronto in 1956 and practised dentistry in Downsview, Ontario. He died in November, 1991.

**Kovitz, Dr. David M.:** Dr. Kovitz graduated from the University of Toronto in 1945. He was a past-president of the Calgary and District Dental Society and the Western Canada Dental Society, and a fellow of the American Society of Clinical Hypnosis and the International College of Dentists. At the time of his death, he was a life member of the Canadian Dental Association. He died February 26, 1992. He was 69.

**Lanthier, Dr. Roland:** Dr. Lanthier graduated from the University of Montreal in 1958. He practised dentistry in Ottawa, Ontario. He died February 11, 1992.

**McCullough, Dr. Norman A.:** Dr. McCullough graduated from the Royal College of Dental Surgeons School of Dentistry in 1926. He practised dentistry in Sutton West, Ontario.

**McKechnie, Dr. Douglas Craig:** Dr. McKechnie graduated from the University of Alberta in 1942. He practised dentistry in Alberta for 36 years. He died November 30, 1990.

**Scott, Dr. Winfield Crosby:** Dr. Scott graduated from Loma Linda University in 1963. He practised dentistry in Mission, British Columbia. He died December 19, 1991.

**Simon, Dr. Norman L.:** Dr. Simon graduated from the University of Toronto in 1936. He practised dentistry in Hamilton, Ontario, and was a life member of the Canadian Dental Association.



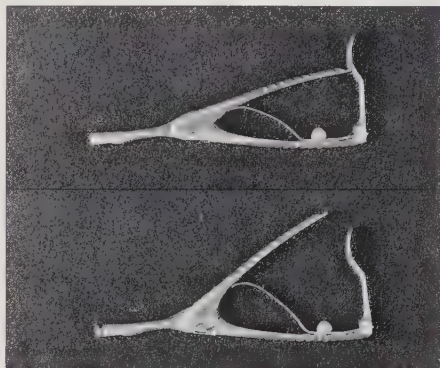
**Smith-Windsor, Dr. Brooke:** Dr. Smith-Windsor graduated from the University of Alberta in 1951. He practised dentistry in Indian Head, Saskatchewan, for more than 40 years. He died January 27, 1992.

**Woytuck, Dr. John:** Dr. Woytuck graduated from the University of Toronto in 1958. He practised dentistry in Boissevain, Manitoba, from 1958-1961, in Drayton Valley, Alberta, for six months, and then in Sherwood Park, Alberta, from 1961 to present. He died February 6, 1992.

## Erratum

In an article that appeared in the January 1992 issue of the *Journal* (Haas, D.A., Young, E.R. and Harper, D.G. Malignant hyperthermia and the general dentist: Current recommendations. *J Canad Dent Assoc* 58(1):28-33, 1992.), **Table III** listed Ketamine as an agent that is absolutely contraindicated in suspected MH patients. In fact, this is no longer the case. The *Journal* regrets the error.

## What's It?



This month's "What's It" was sent to the *Journal* for identification by Dr. Sidney Fleisher of Winnipeg, Manitoba.

The instrument appears to have been used for grasping fine objects or wire – when it's opened, the grooved portion at the end has a serrated finish.

If you know what this instrument was used for, please contact: Dr. Ralph Crawford, *Journal* Editor, 1815 Alta Vista Drive, Ottawa, Ontario K1G 3Y6.

# Letters



## ■ A Year of Celebration

When I read your January editorial (*J Canad Dent Assoc* 58(1):7, 1992), I was struck by the number of dental-care achievements that are worthy of celebration. I commend the *Journal* for focusing an editorial on them. I strongly believe that we develop a better awareness and appreciation of our progress when we take the time to recognize our past.

The Academy of General Dentistry also has cause to celebrate in 1992. It is our 40th year of service to the general practitioner. We are proud of our history, our progress and our focus on continuing dental education. AGD members share an active pursuit of excellence through the pursuit of knowledge. Together we have built an organization that is enthusiastically outspoken on behalf of the general dentist, both in the legislative and public arenas.

This year also marks our passage into a new dimension within organized dentistry. We will embrace the challenges as opportunities, the uncertainties as guideposts to learning.

*William W. Howard, DMD, MAGD*  
Editor, *General Dentistry, Journal of the Academy of General Dentistry*

## ■ Clindamycin and Dry Socket

The January, 1992, edition of the *Journal* contained a report on the effectiveness of clindamycin in reducing the incidence of dry socket (A review of dry socket: A double-blind study on the effectiveness of clindamycin in reducing the incidence of dry socket. *J Canad*

*Dent Assoc* 58(1):43-52, 1992) by Drs. Paul Chapnick and Leslie Diamond. This article provides an excellent description of the clinical features of this problem as well as an extensive review of the literature.

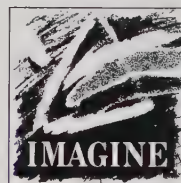
In a well-designed study, the authors compare the effectiveness of clindamycin to a placebo in preventing dry socket. Their conclusion, that "The incidence of dry socket after third molar surgery can be significantly reduced," is not, however, supported by their results. The use of the term significant in a scientific article mandates that statistical tests be applied to the results to determine statistical significance. While the four to one ratio of dry sockets in the control group versus the treatment group appears impressive, these results are not statistically significant. The very small number of dry sockets (less than one per cent) is unfortunately too small to determine statistical significance. While it is possible that additional studies using larger populations may in fact demonstrate this procedure to be effective, the correct conclusion of this study is that the use of clindamycin has not been shown to significantly reduce the incidence of dry socket following third molar surgery.

*Harry A. Hersh DDS.*  
Cambridge, Ontario



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## A LEGEND

One night, in ancient times, three horsemen were riding across a desert. As they crossed the dry bed of a river, out of the darkness a voice called, "Halt!" and they obeyed. The voice then told them to dismount, pick up a handful of pebbles, put the pebbles in their pockets and remount. The voice then said, "You have done as I commanded. Tomorrow at sun-up you will be both glad and sorry." Mystified, the horsemen rode on. When the sun rose they reached into their pockets and found

that a miracle had happened. The pebbles had been transformed into diamonds, rubies and other precious stones. They remembered the warning and they were indeed both glad and sorry. Glad they had taken some, sorry they had not taken more. And this is the story of insurance.

*Author unknown*

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The **1992 FDI World Dental Congress** will be held in Berlin, Germany, September 21-25, 1992, and the Canadian Dental Association has appointed **TourCan Inc.** as the official travel agency for the **1992 FDI World Dental Congress**.

TourCan will be offering two tour packages to Canadian dentists wishing to combine business with pleasure. You may select a pre-convention tour or a post-convention tour (the latter to include meetings and seminars with dentists from Egypt and area) to complement your attendance at the **1992 FDI World Dental Congress**.

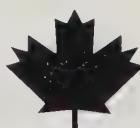
### PRE CONVENTION - GERMANY TOUR

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# The DAP Advisor

*The DAP Advisor offers information, ideas and advice to improve dentist/patient communication, raise awareness about good dental health, and help your practice become busier.*

Every member of the dental team plays an essential role in patient communication. It is the interplay between you, your dental team and your patients that can lead to well-informed, satisfied patients, and form the basis of an enduring dentist/patient relationship.

## Patient Communication: It's a Team Effort

Centuries ago, Shakespeare noted that "all the world's a stage." What he meant, of course, was that life is like a play in which everyone has a role. While it's extremely doubtful that Shakespeare was thinking of the dental office when he made his observation – Elizabethan dentistry being what it was – his statement is nonetheless applicable to the modern dental team. Above and beyond their technical role, everyone on your dental team plays a vital part in communicating with patients.

What follows is a brief run down of the players on your dental team and some of the communication roles they can play:

**The Receptionist:** The receptionist, as a matter of fact, plays many parts. She or he greets patients; smooths ruffled feathers when delays arise; researches information; processes forms; issues and collects bills; books appointments; and recalls patients. All of these roles are crucial to good patient communications. When done efficiently, each conveys to the patient that yours is a well-run and caring practice. In addition, the receptionist can encourage patients to read any dental health information you have on hand in your office while they wait to see you.

**The Hygienist(s):** Often, the patient sees the hygienist more frequently, and for a longer period of time, than he or she sees the dentist. For those patients, the hygienist, not the dentist, is likely to be the primary source of information about good dental health. The hygienist plays the role of educator and informer, discussing the components of good dental health with patients, advising them on how to achieve and maintain it, and encouraging their efforts to do so.

**The Dental Assistant:** At first glance, the dental assistant would seem to play a smaller role in patient communication. She (or he) is, after all, unlikely to be perceived as a primary source of dental information in the dental office. And yet, through her interaction with the patient and the dentist, the dental assistant can communicate a great deal about a practice. An assistant who is at ease helps to put patients at ease, and conveys a sense of teamwork with the dentist. For example, she can communicate to the patients that they are in the hands of capable and caring professionals.

**The Dentist:** The dentist is the manager of the dental team and the person who sets the tone for the entire office. Like the hygienist, the dentist plays the role of educator and informer. A dentist who is committed to effective patient communication – and more important, puts it into practice – can help drive and motivate the communication efforts of the entire dental team. This commitment can help inspire patient confidence in the practice, as well as build dentist-patient rapport.

The members of your team may very well have more, fewer or different roles than this. The point is, however, that these roles have been defined. Patient communication is very much a team effort. And everyone on the team has something positive to contribute.

To get some idea of how effectively the members of your dental team are communicating, you might want to take a few moments and answer the following questions:

- What is the patient communications role of each dental team member in your practice?
- Would you say those roles are appropriate?
- Do you and your team ever discuss these roles?
- Do patients respond positively to the communication efforts of each dental team member?
- If they're not responding well, why not? Is it due to a team member's personality, appearance, way of talking or something else?
- Do you think that one or more members of your team could improve their communication efforts?
- Have you discussed how to improve patient communication efforts with your team?
- Are you doing all you can to ensure that the lines of communication are open between you and your patients?
- Is patient communication a priority in your practice?



*The DAP Advisor is a service of CDA's Dental Awareness Program, an ongoing campaign dedicated to helping all Canadians keep their teeth Good For Life.*

*\* Back by popular demand. This DAP Advisor was first published in the May 1990 issue of the Journal.*

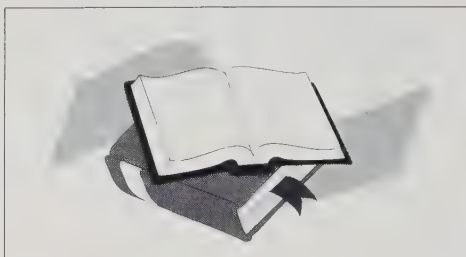


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## Ultrasons

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*One copy of the above package of articles is available for \$5.00 to all CDA members and for \$10.00 to non-members. (plus GST and, Ontario residents, please include 8% sales tax.)*

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# Book Reviews

## **Skinner's Science of Dental Materials, 9th Edition**

**by Ralph W. Phillips**

1991, W.B. Saunders Co., Philadelphia  
597 pages, B & W illustrations

This book, although designed primarily for the dental student, serves the dental practitioner equally well. It represents a lifetime of effort and dedication on the part of the author to enhance the practise of dentistry through the presentation of basic and applied scientific information.

The book's subject matter is divided into 30 logically-sequenced chapters. Students will find that this division is in harmony with the order of presentation of pre-clinical and clinical subjects in the dental curriculum.

Noteworthy changes have been made in the ninth edition to emphasize the importance of recent major advances, and to update information on new materials and their properties. A separate chapter on biologic considerations stresses the biocompatibility of materials and their potential hazard to the dentist and allied dental personnel. In addition, the effects of manipulative variables are constantly stressed.

A chapter on physical properties elaborates on the principals of color, which must be understood to meet esthetic demands. Of particular interest and importance is the introduction of a new chapter dealing with implant dentistry. This is in harmony with the wide acceptance and expanded application of this discipline. However, discussions on the mechanics of cutting with burs have been eliminated from the present edition, as the subject is more appropriately discussed in textbooks on operative dentistry.

All other major topics, such as metals, casting alloys, gypsum products, waxes, casting procedures, soldering and welding, resins and luting agents are adequately discussed, and specific references to newer compositions and developments have been updated.

The traditional reference list at the end of each chapter has been eliminated. In its place, the author provides a carefully selected reading list. Each citation carries a brief summary of its content, which is far more informative and useful to the reader. The author's style of presentation is one of clarity and interest. This book is highly recom-

mended for dental students and for dental practitioners.

In conclusion, the dental community was saddened by the death of the author, Dr. Ralph Phillips, who passed away in March 1991. His textbook is a great legacy for dentistry. Let us hope that his successors will continue in his professional literary style and tradition.

*Reviewed by:*

*Dr. Zack Kasloff, professor, dental materials science, department of restorative dentistry, University of Manitoba.*

## **Applied Dental Materials, 7th edition**

**by John F. McCabe**

1990, Blackwell Scientific Publications  
Boston, Mass., 199 pages, \$49.95  
(U.S.)

This book is intended primarily for undergraduates, although the author notes that it could be of value to dental technicians, dental surgery assistants, and practising dentists.

Traditional topics and more recent advances are both covered. Compared with two of the major books in the field, *Science of Dental Materials*, by R.W. Phillips, and *Restorative Dental Materials*, edited by R.G. Craig, this book offers a condensed presentation. Its purpose is to help the reader develop a working knowledge and understanding of the properties and behavior of dental materials.

The book emphasises the applied side of dental materials, although commercial product examples are not used. Chapters have been altered and new material has been added to this enlarged edition to update certain subject areas.

The author writes in a direct and highly readable style. Chapters are well constructed, with the subject matter presented in a systematic and orderly fashion. An emphasis on material requirements is competently done, and both the level of presentation and the range of subjects covered are well designed for an undergraduate curriculum. However, while the book's condensed approach can help to focus the reader, some essential concepts are not developed sufficiently. Most dental students do not have an undergraduate background in materials science or enough courses in related areas to make full use of this book, and would probably require additional reading materi-

als to develop their knowledge of basic science.

Chapter 1 provides a general overview of the field and explains why the study of the science and application of materials is necessary. Chapter 2 deals with the fundamental properties used to characterize materials and the relevant foundation science. While it covers many pertinent subjects, such as mechanical properties and rheology, the number of pages devoted to these critical areas is insufficient. Students may find that the first two chapters leave them inadequately prepared to make full use of the following chapters. For example, fatigue and fracture toughness are now recognized as important subject areas for the dental student and practitioner. However, while they are often referred to in later chapters, these subjects are not sufficiently developed in Chapter 2 or elsewhere in the book. A major expansion of this foundation chapter is recommended.

Chapters 3-13 consider materials that are processed primarily by the dental technician, but which should be understood by the dentist to promote, among other benefits, positive and productive dental laboratory/dentist interaction. The section comparing base metal to gold alloys for partial removable denture castings is an example of how the applied aspects of dental materials are competently addressed in the text. The subject areas covered in chapters 12 and 13 are also developed particularly well, and serve as examples of how others might be improved. The section on cold working should be expanded, however, since the study of dislocations is central to understanding the mechanical properties/application relationship that governs the application areas of materials, such as ductile metals versus brittle ceramics.

Chapters 14-19 deal with denture liners, artificial teeth and impression materials. The chapters on impression materials present a clear picture of the material properties/behavior relationship, manipulation variables and potential sources of error. Chapters 3-19 would be enhanced by the addition of a separate chapter that drew together and highlighted some of the common problems encountered in the fabrication of appliances, and showed how they could be resolved through informed communication between the technician and dentist.



Chapters 20-29 cover restorative materials that are manipulated by the dentist and dental assistant, including amalgam, composites, adhesive materials and cements. Chapter 24, on adhesive materials, is outstanding. It is distinguished by its thorough development and attention to application. Considering the health questions raised by the release of mercury vapor from amalgam, and the associated public concern, this subject area should be expanded.

There are many features that commend this book, including the author's writing style and emphasis on application. Expansion of selected sections to give sufficient development to difficult but essential basic science concepts, and the addition of more clinical and material photographs, would better target this valuable book to dental students.

*Reviewed by:*

*Elliott J. Sutow, BS, PhD*

*Professor, division of dental biomaterials science, department of applied oral sciences, Dalhousie University.*

## Surgical Endodontics

**by James L. Gutmann and John W. Harrison**

*1991, Blackwell Scientific Publications, Boston, Mass. 468 pages, illustrated text, \$127.*

Endodontic therapy has become a very important aspect of modern dental practise. With the increase in the number of root canal treatments being attempted, the number of non-surgical root canal treatments that may fail for various reasons has also grown. When a reason for failure can be found, then retreatment of the root canal therapy is the best choice. There are times, however, when retreatment of non-surgical root canal therapy is not possible and surgical root canal therapy is indicated.

At one time, there were very few credible reference texts devoted to endodontic surgery, and even today most texts on endodontics devote only a chapter to basic surgical principles. Fortunately, a comprehensive text on endodontic surgery has finally been compiled by Gutmann and Harrison.

The authors have extensive publication experience and are both highly respected in the endodontic field. Their book, as may be expected with a specialty text, is not a basic primer. It is written more for the advanced practitioner than the student. Nevertheless, the

hard-cover book has comprehensive references, which would be applicable to the graduate student, and it also has excellent illustrations.

The casual reader may be drawn to these illustrations and skim over the first chapter on the history of surgical root therapy. But, as it covers the tortuous history of endodontics and surgical treatments, and therefore helps to put our present day expertise in surgical therapy into perspective, it should be read carefully. The chapter is characteristic of the entire text in its thoroughness. It ends with a full bibliography which dates back to before the 1880s, when articles on the subject first began to proliferate. The references are not confined to the English-language literature; many European articles are quoted as well. Operators such as Partch from Germany, for example, were describing the "wurzelspitzenresektion" operation before the turn of the century.

The text explains that, possibly because of the success of these operations on the continent, the era of focal infection did not impact as greatly in Europe as it did in the New World after the 1920s. It has only been since the 1940s that endodontics, and surgical therapy as well, have been able to rebound to prominence again.

Part 1 also includes a chapter on the anatomy and physiology of the periodontium. This should be of special interest to the graduate student who has a better understanding of basic sciences. The chapter on radicular anatomy that follows should be invaluable to the surgeon – who has to know not only the root anatomy but also its relationship to the deeper structures encountered in an invasive operation.

The real strength of the text becomes

apparent in part 2, "Periradicular Surgery." I can see the advances that have been made in surgical treatments since my 30 years of practise, particularly in soft tissue management. We were taught to use the semilunar flap design, which is presently not recommended for elective periradicular surgery. Alternate flap designs, with their various indications, are now much preferred and are fully explained in the text. Illustrations of apicoectomy technique and retrofilling preparations are also well done, and should provide an insight into the near microscopic detail required to perform elective endodontic surgery. There are 679 references in this chapter.

The text does not stop at the retrofilling operation, but continues with site closure, patient management and a discussion on wound healing – all of which are well referenced with timely information.

No dental text could be complete without a chapter on success, failure and prognosis. More can be learned from our failures than from our successes, and examples of incomplete canal debridement, split root and radicular anomalies are presented in the illustrations.

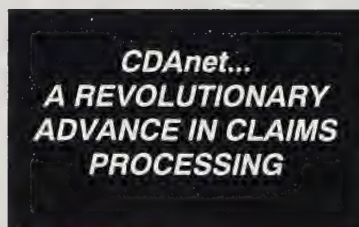
In summary, the authors cover each subject discussed in the text with a thoroughness that is characteristic of the attention to detail required of a successful surgeon. This book will not only be an essential addition to the library of an endodontist, but should also be consulted by any practitioner who performs apical surgery.

*Reviewed by:*

*William H. Christie, DMD, MS, FRCD(C), FICD, associate professor, rehabilitative dental science, University of Manitoba.*

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# The Dental Lab & You

## The Inlay Resin Method

### Accurate Crowns Under the Clasps of Partials

Few procedures cause more difficulty for the dentist, technician, and patient than the fabrication of a crown under the clasp of a removable partial denture. All too often, despite the best efforts of everyone involved, the results are far from satisfactory. Common post-treatment problems include partials that no longer fit properly and clasps that fit over the crown on the model but won't fit properly in the mouth – the list goes on and on. Unfortunately, many of these problems relate to the impression techniques used prior to the fabrication of the crown.

#### The Problems

For example, a partial that has free-end saddles will often drift during standard impression taking. If this occurs, the partial will not seat properly once the crown is fabricated and placed in the mouth.

Impressions and case fabrication can be further complicated if the patient's home and the laboratory are located in different communities. Ideally, for out-of-town patients, impressions should be taken with the partial in place, removed, and sent to the laboratory with the partial. However, while this will lead to the fabrication of a more accurate case, the patient will be without his or her partial for three to five days – a situation that many patients are unwilling to accept. Still, if the impression is taken without the partial in place, it will be difficult for the laboratory to fit the partial to the stone model – unless it is totally tooth-borne (i.e. at least three abutments).

In-town patients, while they can keep their partials, still face up to three visits to the dental office or laboratory for impression taking, fitting the lingual wax-up and, possibly, for labial porcelain application.

Fortunately, there are a number of alternatives to this complex procedure, depending on the case situation and whether or not the partial is sent to the laboratory with the impression.



Mr. H. J. (Hyo) Maier

#### The "Standard" Solutions

If the partial is tooth-borne, inject light body impression material around the preparation and put the partial in place in the mouth. Take an overall impression using a full tray, remove the impression and send it to the laboratory (including the partial, if no anteriors are involved).

If free-end saddles are involved and the abutment is under one of the clasps, it is advisable to take a partial impression, holding the partial in place on the

lingual so that it doesn't drift lingually. The impression is then removed and sent to the laboratory along with the partial.

#### The Inlay Resin Method

Today, using inlay resins such as Duralay\*, a quick, simple technique exists that provides accurate results while allowing the patient to keep his or her partial – the inlay resin method. And it's easy to accomplish by following this step-by-step procedure:

a) Take a simple impression over the prepared teeth without the partial in place.

b) Prepare the Duralay to a putty-like consistency.

c) Lubricate the preparation with a separator (e.g. Vaseline, etc.).

d) Apply Duralay over the prepared tooth.

e) Put the partial in place in the mouth and hold in position until the Duralay sets.

f) Once the Duralay has set, remove the partial and the Duralay coping that was under the clasp.

g) The clasp arms and rests will appear as a "shiny area" on the outside of the Duralay coping.

h) Send the impression and the Duralay coping to the laboratory.



Fig. 1: Partial in place over preparation.



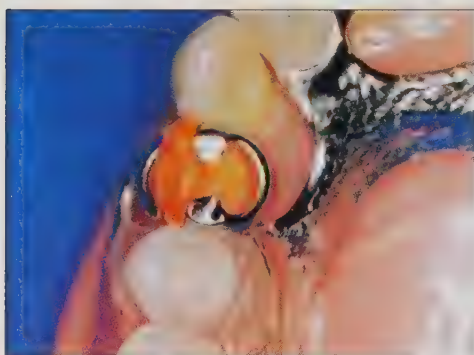


Fig. 2: Occlusal view of the Duralay coping.



Fig. 3: Buccal view of the Duralay coping with clasp in position.

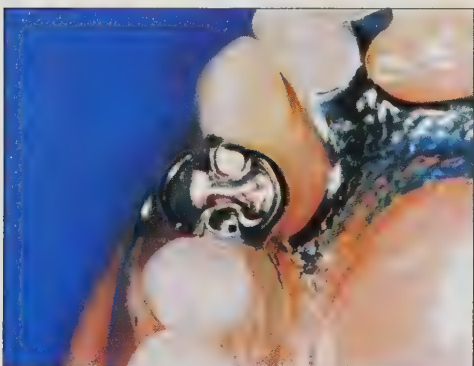


Fig. 4: Metal abutment.

After making a model, the laboratory will fit the coping onto a stone die, cut back except for the rests and clasps (e.g. the gingival margin, occlusal surface, etc.), and wax either a gold or PFM crown. When the crown is finished, the areas under the clasp will be perfectly contoured to receive the partial clasps – without all the possible distortion and inaccuracy of previous techniques.

The inlay resin method, ask your laboratory about it today.

*Mr. H. J. (Hyo) Maier, RDT, is president of Aurum Ceramic/Classic Dental Laboratories Ltd.*

*\* product of Reliance Dental Mfg. Corp.*



Fig. 5: Occlusal view of the finished crown.



Fig. 6: Buccal view of the finished crown with the partial in position.

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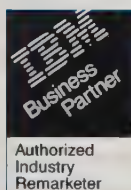
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# Practice Management & Success

## Plugging into Technology

*"To computerize or not to computerize?"*

**T**hat is the question many dentists are asking today – but it shouldn't be. No, the question for dental practitioners in the '90s isn't whether or not to computerize, it's how to computerize and to what extent.

Like it or not, high-tech dentistry is here and it's here to stay. So don't get caught in a technophobic web, hoping that the technological leaps of today will be branded experimental trends in the dental history books of tomorrow. Technology is not fleeting, but those who resist it may well be.

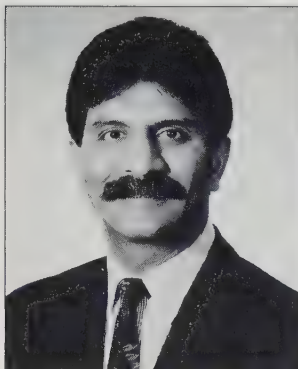
There are many reasons for computerizing your office, some more compelling than others. You and your staff may be fed up with the daily battle of trying to find room for those ever-growing piles of paper. Your educated, informed patients (who are becoming ever more educated and informed) may be asking you when – not if – they can expect to see a video imaging system in your operatory. Or you're simply tired of hearing how your computerized colleague down the street – who has finger-tip control over all areas of his practice – has more time to golf than you do.

Although the specific reasons for computerization vary from practice to practice, the motivating factors can be lumped under a single umbrella – common sense. Computers unleash the potential for streamlining the diagnostics, delivery and management of dentistry in an unmatched, unprecedented and often revolutionary fashion.

### Preparing Now for the Office of the Future

Dentistry is being inundated with new technologies, including voice response charting systems, periodontal diagnostic tests, intraoral video cameras, optical character reading (OCR) for record keeping, milling machines, lasers, and electronic data interchange (EDI), to name just a few.

But is all this new technology justified? It's a good question to ponder. Certainly, each technological marvel can be justified on its own merits. But if you purchased the whole lot, your bill would



*Imtiaz Manji  
B.Sc.  
President of  
ExperDent  
Consultants  
Inc.*

come to hundreds of thousands of dollars, maybe more. Few practitioners have the means or the desire to fully embrace technology at this price.

The key is to choose technologies that meet your present needs *and* provide a price-performance ratio that allows the highest possible level of integration later on. In other words, even if you start off simple, you should be able to increase the sophistication of your system to whatever level you desire in the future, through expansion, upgrading and integrating.

Don't fool yourself. Sooner or later you will need to invest in new technologies. In fact, the quality of the care you provide may soon be measured by the degree to which you are willing to participate in the technological boom. Right or wrong, dental consumers will perceive those dentists who opt for the "tried and true" less favorably than their high-tech counterparts.

A word of caution. Some dentists, faced with climbing overheads and diminishing take home pay, turn to technology as a romantic solution to improving their bottom line. In their haste to "make it all better," they don't do their homework and end up buying computer systems that don't meet their needs. As a result, instead of being a savior, the new technology contributes to increased overheads and heightened staff dissatisfaction.

### Taking the Modular Route

The first IBM PC was introduced a decade ago. Even at this early stage in the technological explosion, it was evident to most computer designers and manufacturers that, due to the dynamic nature of technology, the components of these "boxes" would need upgrading,

expanding, swapping and exchanging.

Although the early computers were somewhat modular and upgradable (within the constraints of the specific model), taking advantage of such features wasn't that simple (unless you were a technological virtuoso who could confidently replace a hard drive in a matter of minutes).

The new modular computers are also upgradable and expandable, and the *right* modular system is far easier to upgrade and more expandable than its non-modular predecessor. This doesn't mean that computer owners from coast to coast will be taking their PCs apart en masse, but as computer technology becomes more and more modular, this scenario isn't too far-fetched.

Although the flexibility of modular computers makes them more attractive than non-modular ones, don't buy just any modular machine. You may end up paying a premium for a machine that offers much more expandability than you'll ever need.

Find out how upgradable the computer is, then determine if this expandability will be necessary to your practice growth and how much it's going to cost. If future upgrading will cost more than purchasing a whole new system, then clearly the computer's expandability is too expensive. And remember that no matter how upgradable it is, the machine will always have certain technical specifications and limitations. In other words, you could use all of its upgrading "capacity" and still end up trapped.

The idea is to find a modular computer that offers flexibility and a sound price-performance ratio. You need to strike a balance between having a computer that offers too little and one that offers too much. And the best way of ensuring that you get what you need now and have adequate leeway to grow in the future is to become familiar with (at least some) computer terminology. As you well know, informed people are notorious for making better decisions.

### Making the Task of Computer Selection Less Daunting

By knowing some computer terminology, you'll be better equipped to de-



termine what you want and need in a system, and what constitutes good value. It's awfully difficult to comparison shop if you haven't the foggiest idea of what you're comparing.

The computer can be divided into two main categories: the central processing unit or CPU (made up of the processor, memory and bus) and devices (input, output and storage).

A computer processes information, be it words, numbers, graphs or pictures in its CPU, the so-called "brain" of the computer, using bits and bytes. Millions of open and closed circuits keep track of data. Since each circuit has two potential positions, either zero or one, this binary information is known as a bit. Since a single bit conveys very little information, bits are gathered into groups of eight, known as bytes.

Every bit of information that the computer uses passes through the processor, which manipulates the data and then directs the output of the processed data to another device (the monitor, hard drive, printer etc.). The most common processors are the 80286, 80386SX, 80386, 80486SX and 80486, all made by Intel.

One of the most popular computers is the "upgradable" 80386. If you purchase this machine, you can change its CPU from an 80386 to an 80486 whenever your computing needs outgrow its capabilities. And even though upgradable computers usually cost about \$200 more than non-upgradable machines, the ability to upgrade, rather than replace, is an asset. If you purchase a truly modular computer today you won't be trapped tomorrow.

The bus is the "highway" that the computer uses to transport data to different parts of the system (like conveyor belts moving items around in a factory). Input from the keyboard travels along the bus to the CPU, which processes it, then puts it back on the bus to an output device, such as a monitor or printer port. Because 80486 and 80386 computers have a 32 bit bus, they are naturally faster than their predecessors, the 80386SX and 80286, which have a 16 bit bus.

An important aspect of the bus is its design. If it employs MCA (MicroChannel Architecture), the computer is likely a true blue IBM (or made by one of the licensed companies). Since MCA is only available under license from IBM, the number of companies developing products for the MCA bus is comparatively limited. Therefore, there is less variety to choose from, and you could pay more

for one of these products than you would for a similar device designed for an EISA (Extended Industry Standard Architecture) bus. Developed by other industry leaders, computers based on an EISA bus are referred to as being IBM compatible or clones.

The type of architecture the bus uses is particularly important if you're interested in video imaging or T-Scan, since these devices will not run on an MCA bus (although rapid technological advances could change this).

How fast the CPU works is determined by the clock speed. A tiny clock inside the computer vibrates millions of times every second. The CPU uses these vibrations to time and synchronize the movement and processing of data, so the more this clock vibrates per second, the faster the CPU works. The vibrations are measured in MegaHertz (MHz, million per second). What appears to be a small increase in clock speed, say from 10 MHz to 12 MHz, is actually a difference of 2,000,000 processed pieces of information per second. Extra clock speed can therefore provide an incredible boost to the overall speed of the computer, to a maximum of 50 MHz.

Co-processors are responsible for doing the number crunching for the CPU. Software programs that require many mathematical computations can tie up a lot of CPU time. The co-processor frees the CPU from this task, allowing these programs to run much faster.

Memory is the space that the CPU transfers data to and from during processing. A computer uses two types of memory, ROM (Read Only Memory) and RAM (Random Access Memory), depending on the task that needs to be accomplished.

RAM consists of memory chips that are used as a temporary, but quickly accessible, storage place for data. As this memory is dependent on a constant power supply, the information it holds will be lost if the power is cut off even for a micro-second. The more RAM a computer has, the faster software programs will run. As a simple rule of thumb, always have more RAM than you need. Increased RAM will speed up your computer and allow the use of larger programs.

The information contained in ROM is stored permanently, and remains unchanged. For example, when the computer is starting up, information stored in ROM instructs it to do a minor system check and then load the operating system.

After the CPU has processed infor-

mation, this data may need to be stored for future reference. Since the computer's random access memory will be erased if the power is shut off, RAM is not useful for permanent storage. For this you must rely on storage devices - floppy disks, hard drives and tape drives.

Floppy disks (or diskettes) save information on plastic disks coated with magnetic material. The amount of information a disk is capable of holding is determined by how tightly the magnetic particles on its surface are packed. This is known as the disk's density. Floppy disks are particularly useful for updating software, but are not ideal for storing large amounts of information. In other words, you would not want to rely on floppy disks to do the daily backup of your system because the procedure would be much too time consuming.

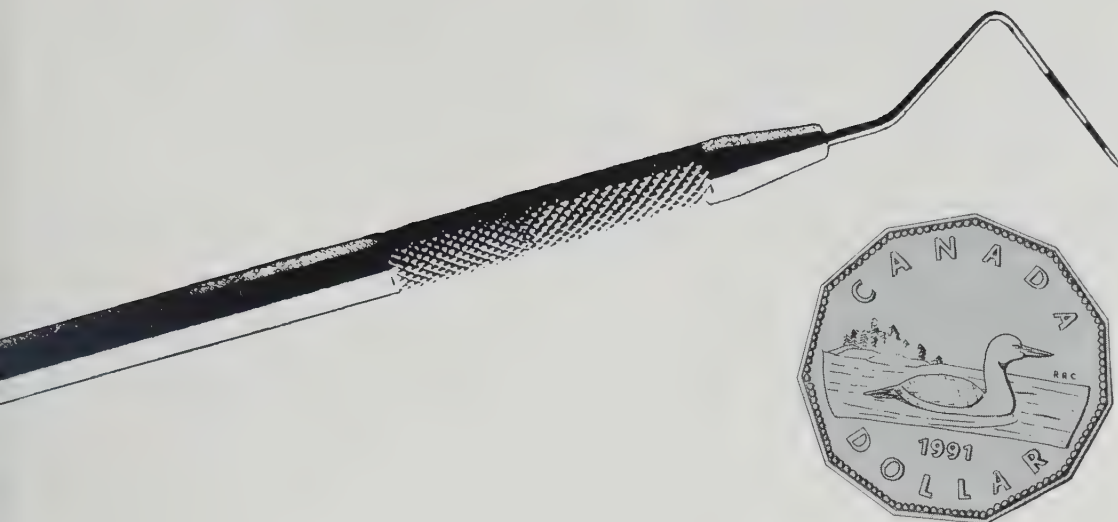
Hard drives are much like floppy disks in that they align magnetic particles in certain patterns to save information. The big difference between floppy disks and hard drives is that the latter are built into the computer, and are therefore not portable like diskettes. But hard drives can store huge amounts of data. It's not unusual for a dental practice to have a 330 megabyte hard drive (although even larger capacities are available).

Tape drives can also hold huge amounts of data, but because they are considerably slower than hard drives, they are not suitable for standard data storage. They are ideal, though, for backing up hard drives. Since backups must be done regularly in anticipation of hard drive failure, tape backups can save a lot of time and effort. And they give you the luxury of being able to take your backup off site, which protects your data from a catastrophe such as an office fire or theft.

Intelligent I/O cards are extremely important when setting up a computer to be a multi-user (multiple work station) system. There are many occasions when the CPU must wait for input from a device before it can continue processing, or when the CPU is busy processing data from one user and cannot accept data from any others.

Without intelligent I/O cards, users would face long delays when trying to get time on the CPU. Intelligent I/O cards take care of this problem because the card contains some control and processing circuitry. This type of I/O card is "smart" enough to send other work to the CPU when it would otherwise have been waiting for input from a device,





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Halifax (902) 453-1885



and to accept and prioritize tasks for the CPU when it's busy doing something else.

When it comes to your system's main monitor (or video), the key differences concern resolution and whether the monitor can display color or not. The best monitor on the market is the VGA (Video Graphics Array) and the second best is EGA (Enhanced Graphics Adaptor). Additional terminals for multi-user systems can be in monochrome or color and must be able to run at a rate of 38,400 baud.

## Summary

One of the most important things to consider before buying a computer is use. Where and how will you use your computer? At home (to do household budgeting, some word processing, and play games?), or at the office (to balance complex budgets, calculate payroll, keep a large database of clientele, and possibly have up to 16 users on the system at the same time?). Will you want to integrate your system with imaging, voice response charting and EDI? (The brilliance of EDI alone justifies automation.)

Keep in mind that what you do with a computer will probably expand as you get more familiar with the technology, so make sure there's room for growth in the computer you select.

Another important aspect to purchasing a computer is service. The company you buy from must be able to provide you with prompt service, and be available when you first explore the realm of microcomputing. If you manage to save money on the purchase price, but it takes six months to have your office computer repaired, you have definitely lost out in the long run.

**TABLE I**

### Recommended Multi-User Business Computer Hardware

| ITEM                         | RECOMMENDED                                                            | DETERMINING FACTORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU                          | 80486 upgradable                                                       | A 32-bit bus is required for multi-user environments. The 80486 CPU operates faster than the 80386 because it has a built-in math co-processor, which cuts down the distance that data must travel to be processed. (Note: The 80486SX CPU does not have a math co-processor, as it has been disabled on this type of CPU.)                                                                                                                                                                                          |
| Clock speed                  | 33-50 MHz (Maybe more in the near future)                              | A fast clock speed is of the essence for multi-user systems. The demands placed on speed by 8 to 16 users can be very substantial.                                                                                                                                                                                                                                                                                                                                                                                   |
| Hard drive                   | 200 megabytes or larger                                                | With the size of multi-user operating systems, which can take up to 40 megabytes of disk space, and the large scale of the programs being run, hard disk space is at a premium. For hard drives that fall into this size range, ESDI or SCSI standards are a must.                                                                                                                                                                                                                                                   |
| Floppy drives<br>Tape drives | 5.25" and 3.5" HD<br>80 to 120 megabyte                                | Even on multi-user systems, it is very handy to have both drive types, and since floppy drives are relatively inexpensive, it is definitely worth having the ability to use either size of diskette. For hard drives as large as are suggested Tape drive for this machine, tape drives will reduce the time it takes to do backups drastically. Note that for many systems there is not enough room to have two floppy drives, a tape drive, and a hard drive. In this case, two floppy drives may not be possible. |
| RAM                          | 8 to 16 megabytes                                                      | Not only the programs, but each and every user that is on the system at one time require RAM. The weakness of many multi-user systems is that they do not have enough RAM for the number of users, programs, and devices that the computer is trying to support at one time. Memory chips for multi-user systems should operate at 0 wait states to fully utilize the CPU.                                                                                                                                           |
| Co-processor                 | Yes (unless CPU is 80486, which has a co-processor built in)           | The demands placed on the CPU by the large number of users leaves available CPU time short. Anything that can help take the burden off the CPU will be welcome.                                                                                                                                                                                                                                                                                                                                                      |
| I/O card                     | Intelligent I/O cards<br>8 to 16 serial ports<br>1 or 2 parallel ports | Since this is a multi-user system, Intelligent I/O is required. This will allow each user to continue working, even if the CPU is not processing their data at the time. Many serial ports are necessary for linking terminals to the CPU. If possible, the I/O card as well as the terminals, should run at 38,400 baud to provide maximum speed for each user.                                                                                                                                                     |
| Video                        | VGA on the console<br>Text only for terminals                          | Even though, at the present time, most multi-user programs do not use much in the way of graphics, this trend is changing. The console, or main monitor, should support color graphics. Serial terminals do not support graphics at the present time. Color serial terminals are available, but they cost a lot more than monochrome.                                                                                                                                                                                |



# Calgary 1992 • August 29 - September 2

## CONVENTION UPDATE

### A Social Program with Real Western Spirit



Bring along your boots, bolo ties and blue jeans. Calgary's planning to show you how the west was fun, with a social program that tips a white hat to our frontier past and present. You'll be treated to a hearty sample of our western hospitality, along with a taste of the very best of the Calgary Stampede.

It all kicks off at the Opening Ceremonies, which will be held at Calgary's elegant new Centre for Performing Arts. Our star-studded variety show features the Young

Canadians, an energetic group of singers and dancers who have earned top billing at the Stampede's Grandstand Show – and an international reputation as first-class entertainers. This talented young troupe will be performing a selection of their own specially arranged and choreographed numbers.

Sharing the spotlight with the Young Canadians is country vocalist Cindy Church and her band, the Rhythm Rangers. A "homegrown" talent, Cindy is becoming known nationwide for her unique vocal stylings. She has performed and recorded with fellow Albertans like Ian Tyson, and is heard frequently on CBC radio.

Next on the program are the Young Fiddlers, a high-spirited group of violinists ranging in age from 10 to 18. These exuberant performers present a rousing – and frequently acrobatic – celebration of country music that will have your toes tapping and your hands clapping.

The western fun doesn't stop when the curtain falls on our variety show. On Monday, it's Stampede Rodeo Night, an evening designed to give you a front-row seat for the rough and rowdy events that made the Stampede famous. You'll experience the thrill of watching the world's finest cowboys battle against the

meanest, toughest outlaw stock. You'll see it all – from calf roping to bull riding to steer wrestling – and you'll discover why the Stampede's been branded "The Greatest Outdoor Show on Earth."

When the wild-west rodeo's over, the hoedown begins. A honky-tonk dance band will be in full swing. And you'll be hard-pressed to stay in your seat when the lively two-step dance company invites you to join them for a little fancy footwork.

Tuesday's closing-night party will also offer you plenty of opportunities to swing your partner, and a chance to step out in style. At the Western Formal Gala, Cowtown goes Uptown. The dress is "black-tie cowboy." Which means you can darned near wear anything: a tux jacket and a bolo tie, a silk shirt and blue jeans ... and, of course, your cowboy hat and boots.

You'll be dancing non-stop. We're topping off our big event with the Big Band sounds of the Eric Friedenberg Orchestra, and the music of the 50s, 60s and 70s, performed by the Fun Company. Popular saxophonist/bandleader Eric Friedenberg has appeared on numerous national television specials and has performed on many albums. The Fun Company is Calgary's foremost party band. The group was featured at the Opening Ceremonies of the Winter Olympics, and is a star attraction on the Stampede's main stage year after year.

We hope you'll be front and centre for the Gala, and all the other events that make the Social Program such a delightful part of our annual get-together. We've rounded up the best of the west for you, and we can't wait to give you a 10-gallon welcome – and show you a hootin' hollerin' good time.

*Stuart Yaholnitsky, D.D.S.  
Chairman, Social Program  
1992 Convention Committee*

## WIN A JEEP!

A jeep that is not only built to handle the "rough stuff" ... but is also built for comfort and convenience for smooth city driving.

This beautiful "all terrain" Jeep YJ 1992 can be YOURS!

All you have to do is pre-register for the 1992 CDA Convention and you will receive your draw tickets by mail with your delegate package.

This draw is sponsored by Aurum Ceramic/Classic.





## Calgary 1992

### Limited attendance Pre-convention Courses



Saturday, August 29

**Jennifer de St. Georges**  
Monte Sereno, California

#### A.M. "Handling Key Time Management Problems"

Time management is the key to a successful practice. Subjects to be covered:

- Scheduling problems
- Nine golden rules for handling office emergencies
- 24 benefits of a five-minute morning meeting

#### P.M. "Taking the Risk out of Risk Taking"

The lecturer will present participants with a prescription for tomorrow's practice.

- Giving patients quality of care
- Moving the dental practice to the next level of management



Saturday, August 29

**Howard Martin, D.M.D.**  
Silver Spring, Maryland

#### "High Tech Root Canal – Flare, File, Fill"

Hands-on – Limited Attendance  
Sponsored by CAULK CANADA

This course will increase your clinical experience in technological advances to do more endodontics with ease, effectiveness and efficiency.

- Caviendo ultrasonic endodontics
- Endotec & warm lateral condensation
- Control Safe end K/H file & handle
- M series automated canal orifice opener
- 2 in 1 endo access bur for penetration and opening
- Curved canal management
- One appointment endodontics



Saturday, August 29  
Sunday, August 30

**Jay R. Friedman, D.D.S.**  
Los Angeles, California

**Gary R. O'Brien, D.D.S.**  
Los Angeles, California

#### "Surgical and Prosthetic Implants"

Hands-on – Limited Attendance  
Sponsored by DENTSPLY/CORE-VENT

On the first day, the course will concentrate on the current knowledge and information relating to the surgical placement of cylindrical endosseous fixtures. Restorative implant dentistry through the use of different components will be reviewed. Evaluation and treatment planning procedures for single tooth, partially edentulous and completely edentulous patients will be discussed. Fabrication of stents will be shown. The methods of connection between natural teeth and implants, if needed, will be reviewed.

The second day of this course will feature surgical and prosthetic hands-on training.



Sunday, August 30

**Terry Donovan, D.D.S.**  
Los Angeles, California

#### "Esthetic Restorative Dentistry and Materials Update"

Topics to be covered include:

- Essentials for soft tissue esthetics on fixed prosthodontics;
- Effective gingival displacement;
- New materials and techniques for fabrication of provisionals;
- Review of impression materials;
- New impression techniques;
- Solutions for fractured porcelain: metal bonding - mystery & myth;
- Current thoughts on bonding to tooth structure;
- Conservative esthetic techniques: bleaching, enamel microabrasion;
- Bonded porcelain: veneers, inlays/onlays, use in oral rehabilitation;
- Other current topics.



# Calgary 1992

## Highlights of the 1992 Convention Program

Monday, August 31 • Tuesday, September 1 • Wednesday, September 2 (a.m. only)

### 75<sup>TH</sup> ANNIVERSARY OF THE FACULTY OF DENTISTRY AT THE UNIVERSITY OF ALBERTA

CHARLES BAKER, D.D.S., M.Sc.  
*University of Alberta, Edmonton, Alberta*

#### **"Contemporary Radiographic Techniques Assisting in Effective Implant Utilization"**

This presentation will be devoted to a rationale for radiologic evaluation of patients prior to implant choice, methodology of examination of the maxillary and mandibular bones for site selection and radiologic evaluation of the implant post insertion.

Topics will include: financial or equipment availability problems, conventional radiography, tomography, computer axial tomography.

KEITH COMPTON, B.Sc., D.D.S., M.S.  
CHRISTOPHER ROBINSON, D.D.S.  
*University of Alberta, Edmonton, Alberta*

#### **"Complications with Dental Implants – "This Could Never Happen to Me..."**

This humorous, quick-moving presentation will provide both the inexperienced and experienced practitioner with thought-provoking insight when things don't go as "planned".

Topics will include: problem-solving with the use of a variety of implant systems and the definable criteria for success with implants.

SHARON COMPTON, Dip.D.H., B.S., M.A.  
*University of Alberta, Edmonton, Alberta*

#### **"The Challenge and Importance of "Plaque-Free" Implant Fixtures**

This presentation will address the implications of hygiene maintenance with emphasis on the challenges it presents to the older adult.

Topics will include: the importance of careful monitoring of implantology patients and guidelines for recall protocol, factors to consider in the examination and assessment of the peri-implant tissue.

ROBERT BOYD, D.D.S., M.Ed.  
*San Francisco, California*

#### **"Surgical, Restorative and Splinting Procedures for Stability in the Post-Orthodontic Occlusion"**

The most recently developed methods of enhancing the stability of the post-orthodontic occlusion will be discussed.

Topics will include: frenectomy, fiberotomy, new methods for direct bonding, splinting and restorative procedures, the correct timing and integration of finishing procedures of orthodontic treatment, selective grinding and restorative procedures in the post-orthodontic occlusion.

ANITA JUPP  
*Burlington, Ontario*

#### **"New Horizons for the Accelerated Practice of the 90's"**

Monitoring the financial success of your practice in a constructive way and retaining qualified team members that will compliment your practice.

Topics will include: dealing with difficult patients, with an emphasis on service and patient communication for the acceptance of optimum dental care.

EDWARD KISLING  
*Vancouver, British Columbia*

#### **"How to Collect Accounts Receivable and Still Retain the Patient As a Patient"**

Collecting accounts receivable and granting credit are an integral part of the Canadian Business scene. However, it is only through the proper education and training of patients and staff, through the use of sound business methods can granting and collection of accounts receivable be effective and successful.

STEVEN LEWIS, D.D.S.  
*Los Angeles, California*

#### **"Esthetics and Osseointegration"**

Over the past several years, there has been an evolution in implant components improving the esthetic results. These components now make osseointegration as acceptable for partially edentulous patients as for edentulous patients.

Topics will include: a review of the history of osseointegration and its application in the treatment of partially edentulous patients providing esthetic restorations.

## Table Clinics

Table Clinics are defined as a brief table top presentation or demonstration of five to ten minutes duration using visual aids, and repeated over a 2 1/2 hour period.

Those interested in presenting, write to:

TABLE CLINICS  
CDA Conventions  
1815 Alta Vista Drive  
Ottawa, Ontario K1G 3Y6



# Calgary 1992

## Highlights of the 1992 Convention Program

Monday, August 31 • Tuesday, September 1 • Wednesday, September 2 (a.m. only)

ANNETTE LINDER, R.H.D., B.S.

*Richmond, Virginia*

### **"Recall Redefined: Design for Clinical and Practice Success"**

The recall appointment has been considered the most undervalued appointment. This course will provide the requirements for design and implementation of a recall appointment.

Topics will include: developing a pro-active model for patient participation, creating the New Patient recall, functions of the recall appointment, identification of periodontal, restorative and esthetic dental needs, communication skills that facilitate case acceptance.

— and —

### **"Hygiene Department Development"**

This course will show you how to transform the hygiene department (and the entire practice) into one that is clinically responsible, ethically sound and highly productive!

Topics will include: research update and clinical overview, the 4-function recall appointment; treatment modalities, case planning, case acceptance; active therapy vs. maintenance, scheduling effectively, staff development, interpersonal skill development.

---

JOHN McDOUGALL

*Santa Rosa, California*

### **"Nutrition for the Dental Patient"**

The dentist needs to help the patients with their diet — after all, the mouth is the portal of food entry. This presentation will focus on dietary teaching methods that the general dentist can use to educate his or her patients.

Topics will include: a no-cholesterol diet for heart disease patients; what to tell your dental patients with high blood pressure; simple effective weight loss for those patients who can't fit in the dental chair; the importance of nutrition in the health of the mouth; practical tips on shopping, cooking and eating.

JOHN MOLINARI, Ph.D.

*Detroit, Michigan*

### **"Hepatitis B and Aids: Challenges to Infection Control"**

The documented risk of Hepatitis B virus (HBV) and the perceived risk for Human Immunodeficiency Virus (HIV) infection have dramatically increased the awareness of dental professionals of the need for infection control.

Topics will include: the impact of HBV, HIV and Acquired Immunodeficiency Syndrome (AIDS) with regard to epidemiology, etiologic agents, clinic and asymptomatic diseases, transmission, high risk behavior, diagnosis and preventive measures.

— and —

### **"Infection Control in a Changing World"**

Appropriate infection control in dental practice is a necessary, yet sometimes difficult, goal to accomplish. The documented risk of hepatitis B and the perceived risk for Acquired Immunodeficiency Syndrome (AIDS) have increased the awareness of dental professionals of the need for infection control.

Topics will include: the application of universal precautions for the dental treatment of all patients; the appropriate use of vaccines, barrier techniques and methods of sterilization; disinfection procedures, aseptic technique and waste management.

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KEN NEUMAN, D.M.D.

*Vancouver, British Columbia*

### **"Cosmetic Imaging — The Ultimate Communication Tool"**

Computer Imaging is an evolving technique for communicating to the patient the end result before initiation of treatment.

Topics will include: the many uses of imaging systems, both extra and intra-oral; their communication values; the options of use with clinical examples of how to integrate these systems into daily practice; the new high tech items available today and how the use of these will impact the practice of the future.



## **Golf the Kananaskis ... at the "C.D.A. Golf Classic"**

**Sponsored by Aurum Ceramic/Classic**

Enjoy the spectacular beauty of the Kananaskis Golf & Country Club.

**Friday, August 28, 1992**

The registration fee covers green fees, power cart and steak barbeque.

In addition, all registered golfers will receive a registration package including an AM/FM stereo cassette, golf hat, golf balls, tees and ball markers!

Dentists participating in the C.D.A. Golf Classic will have the opportunity to win a "Golf Getaway in Palm Desert". The draw will be made at the convention.

To register, see the advance registration form. Attendance is limited!





# Calgary 1992

## Highlights of the 1992 Convention Program

Monday, August 31 • Tuesday, September 1 • Wednesday, September 2 (a.m. only)

ROY PAGE, D.D.S., Ph.D.

*Seattle, Washington*

### **"Frontiers in Periodontics: From the Laboratory to the Clinic"**

This lecture, divided into three sessions, will summarize the mass of recent research data and make direct application to the clinical problems of diagnosis and treatment of periodontal diseases, with special emphasis on the early-onset, aggressive forms of periodontitis. Topics will include: prevalence, progression and etiology of periodontal diseases; the differential diagnosis of periodontal diseases; new approaches to the diagnosis and treatment of periodontal diseases.

H. JACK STOCKTON, D.M.D., C.F.P., M.B.A.

*Winnipeg, Manitoba*

### **"Dental Practice Economics – Effective Financial Analysis and Planning"**

The objective of this program is to present important financial information and concepts which should assist the dentist-manager in effective managerial decision-making for the dental practice.

Topics will include: the economics of dental practice and revenue/expense data for the typical dental practice; practice revenue mix and overhead expenses; the concept of return on investment; a useful model for dental practice analysis, budgeting and income projection; a simple method of assessing staff payroll expense.

SHARON WOOD

*Canmore, Alberta*

### **"Mountains of Challenge"**

Sharon Wood became the first North American woman to reach the summit of Mount Everest in 1986. Her presentation is a compelling true story about beating the odds. She speaks on meeting that challenge and the associated struggles and gains that closely parallel those of most striving individuals and organizations.

DONALD YU, B.S., D.M.D., M.Sc.D.

*Edmonton, Alberta*

### **"Micro Tissues, Micro Issues: How to Feel, Fill, Thrill Accessory Canals"**

High demand by an informed public for endodontic services demonstrates that dental practitioners must be abreast of proven and predictably successful endodontic techniques. In order to be successful in endodontic therapy, you must possess a comprehensive knowledge of the morphology and the root canal system.

Topics will include: radiographic interpretations of clinical cases; the rationale and therapeutic end point of endodontic therapy; how to find, feel clear and shape the accessory canals in the root canal system; the vertical compaction of warm and plasticized gutta-percha.

More summaries will follow in the next issue of the CDA Journal:

HAROLD GOODIS, D.D.S.

*San Francisco, California*

### **"Lasers in Endodontics"**

RONALD E. JORDAN, D.D.S.

*Winnipeg, Manitoba*

### **"Dental Materials & The Amalgam Controversy"**

MARY KRYWULAK, D.D.S., M.S.

*Ottawa, Ontario*

### **"Pharmacology"**

CLAUDE LAMARCHE, D.D.S.

*Montréal, Québec*

### **"Prosthodontics" (Lecture given in French)**

LAURALYNN MEALING

*Burnaby, British Columbia*

### **"Home Computers"**

ALAN R. MILNES, D.D.S., Dip.Paed., Ph.D.

*Toronto, Ontario*

### **"Paediatrics"**

JOEL WHITE, D.D.S.

*San Francisco, California*

### **"Research and Lasers: Clinical Effects"**



Heritage Park is Canada's largest living historical village, located on sixty-six acres, right in the heart of Calgary. All the sights and sounds of pioneer life are recreated for your enjoyment, from the Hudson Bay's fur trading post to the 1914 railway town, including the only authentic antique sternwheeler.

(Photo courtesy of Calgary Convention & Visitors Bureau)



# Calgary 1992



## Spouses' Program

The sheer variety of this program will convince you to register today!

### MONDAY, AUGUST 31, 1992

- |               |                                                                                                                                                                                                                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:00         | Breakfast                                                                                                                                                                                                                                                                   |
| 10:30 - 12:30 | Sharon Wood, the first North American woman to reach the summit of Mount Everest in 1986, will present a compelling true story about beating the odds in "Mountains of Challenge".                                                                                          |
| 12:30 - 16:00 | Rotary House - Stampede Grounds: Hors d'oeuvres and wine will be served against a background of music played by Harpist Debra Nyack. Later, we will bring the shopping to you! Local artists and artisans will display their dazzling creations for your shopping pleasure. |

### TUESDAY, SEPTEMBER 1, 1992

- |               |                                                                                                                                                                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:00 - 08:00 | Breakfast                                                                                                                                                                                                                                                                            |
| 08:00 - 10:00 | Helen Vanderburg, world swimming champion and a fitness professional, member of the Canadian and International Sports Hall of Fame, will present "Building a Lifestyle for Success". The topics will include: characteristics of high performers, attitude, energy and goal-setting. |
| 10:00 - 12:00 | Transfer by bus to Spruce Meadows and tour this world-class equestrian centre                                                                                                                                                                                                        |
| 12:30 - 12:50 | Presentation by Brenda Finley, co-producer and host of Calgary Television's daily news program, the second most watched late night local news program in the country.                                                                                                                |
| 12:50 - 14:00 | Lunch accompanied by the flute and guitar duo "Flute Plus"                                                                                                                                                                                                                           |
| 14:00 - 14:30 | Entertainment by Eddie and the Earthtones                                                                                                                                                                                                                                            |
| 15:00 - 15:30 | Depart Spruce Meadows for Calgary                                                                                                                                                                                                                                                    |

## Programs for Tots, Children and Teens

### Different Activities for each Age Group!

#### TOTS' PROGRAM (ages 2-4)

##### Monday, August 31st and Tuesday, September 1st

A drop-off centre at the downtown YM-YWCA has been reserved for your convenience. While you are enjoying the spouses program and doing some shopping in Calgary, your tots will be playing games and having great fun, under the professional supervision of YWCA day-care providers.

#### CHILDREN'S PROGRAM (ages 5-12)

##### Monday, August 31st

- |               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| 07:45 - 08:15 | Pick up at Convention Hotels (parents must sign in their children)                      |
| 08:30         | The Morning Show                                                                        |
| 09:00         | Swimming at the YWCA                                                                    |
| 10:30         | Visit to the Calgary Energium                                                           |
| Noon          | Lunch at the top of the Calgary Tower                                                   |
| 13:30         | Rollerskating (Lloyd's Rollercoade)                                                     |
| 16:00 - 17:30 | Return to YWCA and drop off at Convention Hotels (parents must sign out their children) |

##### Tuesday, September 1st

- |               |                                                                                                             |
|---------------|-------------------------------------------------------------------------------------------------------------|
| 07:45 - 08:15 | Pick up at Convention Hotels (parents must sign in their children)                                          |
| 08:30         | The Morning Show                                                                                            |
| 09:00         | Bus pick up for Calaway Park                                                                                |
| 09:30         | Visit the Flintstones in Calgary's Bedrock theme park. Rides, live shows, and many more attractions. Snack. |
|               | BBQ LUNCH                                                                                                   |
| 16:00 - 17:30 | Return to YWCA and drop off at Convention Hotels (parents must sign out their children)                     |

#### TEENS' PROGRAM (ages 13-16)

##### Monday, August 31st and Tuesday, September 1st

The Alpine Club of Canada offers overnight mountain adventure for your fun-seeking, active teens! Teens will be bussed from Calgary to Lake O'Hara and Roger's Pass where they will experience the beauty of the great Alberta outdoors, accompanied by professional guides. Registration fees include food, accommodations, transportation, guides and chaperones.





# 1992 CANADIAN DENTAL ASSOCIATION ANNUAL CONVENTION

August 29 - September 2, 1992 • Calgary

## Hotel Reservation Form

**Please check appropriate category:**

☐ Dentist ☐ Hygienist ☐ Assistant ☐ Office Personnel ☐ Exhibitor (Company name: \_\_\_\_\_)

☐ Other (please specify) \_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ Province: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Telephone: (\_\_\_\_) \_\_\_\_\_ (\_\_\_\_) \_\_\_\_\_  
(Residence) (Office)

**Type of Room:**

☐ Single ☐ Double ☐ Twin ☐ Other (please specify) \_\_\_\_\_

Special Requests: \_\_\_\_\_

**Indicate your hotel choice\* (by numbering the boxes):**

- ☐ Skyline Plaza Hotel (CDA Headquarters) ..... \$ 105.00 single / double  
☐ The Palliser (CDA Headquarters) ..... \$ 110.00 single / double  
☐ The International ..... \$ 100.00 single / double  
☐ Delta Bow Valley ..... \$ 115.00 single / double  
☐ The Westin Hotel ..... \$ 125.00 single / double

\* Prices do not include GST or PST (5% PST in Alberta)

Arrival Date: \_\_\_\_\_ Arrival Time: \_\_\_\_\_ Departure Date: \_\_\_\_\_

**All changes and/or cancellations must be made through CDA Conventions (613) 523-1770.**

In order to reserve a room, a guarantee for the first night is essential. The guarantee will apply to the first night ONLY.  
To cancel your reservation advise the CDA at least three (3) days prior to your arrival.

☐ MasterCard ☐ American Express ☐ VISA Card Number: \_\_\_\_\_ Expiry Date: \_\_\_\_\_

Signature: \_\_\_\_\_

**Send Reservation Form to:** CDA Conventions, Canadian Dental Association,  
1815 Alta Vista Drive, Ottawa, Ontario K1G 3Y6

**DEADLINE for Reservations:** July 10, 1992

### Making your Airline Reservations



Air Canada has been appointed the sole official carrier for the Canadian Dental Association 1992 Annual Convention in Calgary. Special arrangements have been made with Air Canada to offer convention participants discounts on air fares. To take advantage of this service, you must call Air Canada's Convention Central when booking your tickets (your travel agent can call on your behalf). Dial 1-800-361-7585 and quoting Event No. CV920421, you can benefit from savings up to 65% on the regular Hospitality Class, with minimum guaranteed savings of 15% on the full Hospitality and Executive Class services.

Not to be overlooked, Air Canada has graciously offered two economy class return tickets good for travel on any Air Canada serviced destination (except Bombay and Singapore). This will be the prize awarded in our Advance Registration Draw. To be eligible for the draw, dentists and dental team members must register for the convention **before July 10, 1992.**



CANADIAN DENTAL ASSOCIATION CONVENTION  
Calgary • August 29 - September 2, 1992

PRE-REGISTRATION FORM • Please PRINT

ONE FORM PER PERSON. To ensure your requests are accommodated - register early.  
Advance registrations will be accepted until July 10, 1992 after which they will be returned to the sender. Each on-site registration will be subject to a \$27.00 administrative fee (GST included).

SURNAME: \_\_\_\_\_ FIRST NAME: \_\_\_\_\_ SEX: M F

ADDRESS: \_\_\_\_\_ (Street) \_\_\_\_\_ (City) \_\_\_\_\_ (Province)  
TELEPHONE: ( ) \_\_\_\_\_ ( ) \_\_\_\_\_ (Residence)  
(Postal Code) \_\_\_\_\_ (Office) \_\_\_\_\_  
CDA Membership Number: \_\_\_\_\_ License Number: \_\_\_\_\_

PRE-CONVENTION • AUGUST 29, 30 • LIMITED ATTENDANCE

|                                                         |         |        |
|---------------------------------------------------------|---------|--------|
| SATURDAY, AUGUST 30                                     |         |        |
| Jennifer de St. Georges - PRACTICE MANAGEMENT - Lecture |         |        |
| Dentist                                                 | .....\$ | 155.00 |
| Staff                                                   | .....\$ | 70.00  |
| Howard Martin, D.M.D. - ENDODONTICS - Hands-on Program  |         |        |
| Dentist (limited to 40 participants)                    | .....\$ | 185.00 |

|                                               |         |        |
|-----------------------------------------------|---------|--------|
| SUNDAY, AUGUST 30                             |         |        |
| Terry Donovan, D.D.S. - RESTORATIVE - Lecture |         |        |
| Dentist                                       | .....\$ | 155.00 |
| Staff                                         | .....\$ | 70.00  |

|                                                                           |         |        |
|---------------------------------------------------------------------------|---------|--------|
| Jay Friedman, D.D.S. & Gary O'Brien, D.D.S. - IMPLANTS - Hands-on Program |         |        |
| • TWO-DAY COURSE: SATURDAY AND SUNDAY •                                   |         |        |
| Dentist (limited to 40 participants)                                      | .....\$ | 350.00 |

\* GST is not charged on Pre-convention courses / Lunch is included in Pre-convention courses.

CONVENTION • AUGUST 31, SEPTEMBER 1 and SEPTEMBER 2 (a.m.)

|                                           |                                   |
|-------------------------------------------|-----------------------------------|
| <input type="checkbox"/> DENTIST          |                                   |
| Member, CDA or Alberta Dental Association | ..... Nil                         |
| Non-member, Others                        | ..... (7% GST included) \$ 190.00 |
| Includes: Scientific sessions, exhibits   |                                   |

|                                           |                                   |
|-------------------------------------------|-----------------------------------|
| <input type="checkbox"/> DENTAL HYGIENIST |                                   |
| CDHA Member                               | ..... (7% GST included) \$ 80.00  |
| Non-member                                | ..... (7% GST included) \$ 115.00 |
| Includes: Scientific sessions, exhibits   |                                   |

|                                           |                                   |
|-------------------------------------------|-----------------------------------|
| <input type="checkbox"/> DENTAL ASSISTANT |                                   |
| CDAA Member                               | ..... (7% GST included) \$ 80.00  |
| Non-member                                | ..... (7% GST included) \$ 115.00 |
| Includes: Scientific sessions, exhibits   |                                   |

|                                            |                                  |
|--------------------------------------------|----------------------------------|
| <input type="checkbox"/> TECHNICIAN        |                                  |
| .....                                      | ..... (7% GST included) \$ 80.00 |
| Includes: Scientific sessions and exhibits |                                  |

|                                                   |                                  |
|---------------------------------------------------|----------------------------------|
| <input type="checkbox"/> ADMINISTRATIVE PERSONNEL | ..... (7% GST included) \$ 80.00 |
| Includes: Scientific sessions and exhibits        |                                  |

|                                            |                                  |                                    |                                    |             |
|--------------------------------------------|----------------------------------|------------------------------------|------------------------------------|-------------|
| <input type="checkbox"/> STUDENT           | <input type="checkbox"/> Dentist | <input type="checkbox"/> Hygienist | <input type="checkbox"/> Assistant | .....\$ Nil |
| Includes: Scientific sessions and exhibits |                                  |                                    |                                    |             |

|                                                               |                                   |
|---------------------------------------------------------------|-----------------------------------|
| <input type="checkbox"/> SPOUSE / GUEST                       | ..... (7% GST included) \$ 125.00 |
| Includes: Scientific sessions, exhibits and Spouses' Program. |                                   |

|                                                  |                                                                          |
|--------------------------------------------------|--------------------------------------------------------------------------|
| <input type="checkbox"/> TOTS / CHILDREN / TEENS | ..... (7% GST included) \$                                               |
| Tots - Drop-off Centre                           | \$3.00 / hourly <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Children 5 - 12 years                            | — \$80.00 / Teens 13 - 16 years — \$140.00 /                             |

|                                                           |                                                                      |
|-----------------------------------------------------------|----------------------------------------------------------------------|
| <input type="checkbox"/> SOCIAL EVENTS                    |                                                                      |
| Sunday - Opening Ceremony - Subject to space availability |                                                                      |
| Will attend                                               | <input type="checkbox"/> Yes <input type="checkbox"/> No .....\$ Nil |
| Monday - Stampede Rodeo Night                             |                                                                      |
| (per person)                                              | ..... (7% GST included) \$ 50.00                                     |
| Tuesday - President's Gala - "Western Formal"             |                                                                      |
| (per person)                                              | ..... (7% GST included) \$ 70.00                                     |
| FUNDATION - Monday A.M.                                   |                                                                      |
| (per person)                                              | ..... (7% GST included) \$ 20.00                                     |

|                                                              |                                 |                            |
|--------------------------------------------------------------|---------------------------------|----------------------------|
| <input type="checkbox"/> GOLF TOURNAMENT - Friday, August 28 | H/C                             | AVG.                       |
| .....                                                        | Doctor - including golf         | (7% GST included) \$ 80.00 |
| .....                                                        | Spouse / Guest - excluding golf | (7% GST included) \$ 50.00 |

|                                                       |                                  |
|-------------------------------------------------------|----------------------------------|
| <input type="checkbox"/> CDHA Reception and Banquet - |                                  |
| Tuesday, September 1, 6:00 p.m.                       | ..... (7% GST included) \$ 50.00 |

|                                                    |                                  |
|----------------------------------------------------|----------------------------------|
| <input type="checkbox"/> CDAA / ADAA Awards Gala - |                                  |
| Tuesday, September 1, 6:00 p.m.                    | ..... (7% GST included) \$ 25.00 |

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|---------------------------------------------------------------|--------------------------|
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# Let's Talk

## A Survival Guide for Dentists

By the time you read this column, all Canadian Dentists' Insurance Program (CDIP) participants will have received a copy of a special newsletter entitled *How to make an informed decision about your insurance coverage - A Survival Guide for Dentists*.

This newsletter was published to provide the dental profession with further ammunition to combat the outrageous claims and scare tactics being used by insurance agents and brokers in letters to dentists across Canada. Their sole aim is to shake your confidence in CDIP and panic you into making a misinformed decision on your insurance needs.

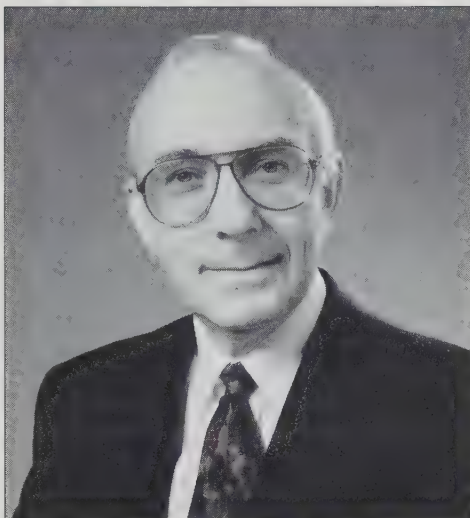
Many of these letters have been forwarded to me, and I have read them with great interest. In light of these letters, please be assured that CDIP's life, long-term disability and office overhead expense plans, despite becoming more costly, are still quite competitive in the vast majority of situations.

My first reaction was to respond to each of the letters, but then I realized that doing so would simply add legitimacy to their claims. Instead, Canadian Dental Service Plans Inc. (CDSPI) has selected a more appropriate approach to the problem.

We believe that the best way to address the misinformation contained in the letters is to inform dentists of the facts. If our colleagues are properly informed about insurance, and about the ways in which facts can be distorted, then they will not fall victim to the half truths being advanced by the brokers and agents. To this end, we plan to put together various materials that will provide valuable insurance information that we can all benefit from.

Our first information piece will be the newsletter described above. It contains a number of easy-to-read, non-technical articles such as: Comparing LTD Insurance, Handling Sales Pressure, Agent Compensation, How to Save on Insurance, and Straight Facts about your new Life and Disability Insurance. It also includes actual examples of how our free insurance review service has helped dentists to get the coverage they need.

Throughout 1992, education will be



*Dr. Mel Charendoff  
president of CDSPI.*

the ongoing theme of our monthly articles in the *CDA Journal*. Articles will also appear in provincial bulletins and dental society bulletins. In addition, we will address the very important issue of rehabilitation and show how our new insurer, Prudential Group Assurance, will play a major role in getting people back to work. I need not tell you how important this is in keeping CDIP strong.

Our Corporate newsletter, *The CDSPI Edge*, will carry regular articles on CDIP throughout the year. We will also attend

many provincial annual meetings to address any questions or concerns you may have. In addition, wherever possible, we will be conducting table clinics or making presentations at both annual and society meetings. At all of these gatherings, complete CDIP Information Kits will be available, including the popular insurance planning guides.

Throughout the remainder of the year, we will be producing other materials that will help the dental profession to understand the value and benefits of their insurance program. In addition, new, exciting developments are under way.

As you can see, there will be a great deal of valuable information coming your way from CDSPI in 1992. We do not plan to do any direct head to head comparison in our advertising. This would cost a great deal, and quite likely add to the confusion. We would happily do so in private through our free insurance review program, or at any time someone wishes to call.

We believe that all of these activities will definitely show that CDIP, after 32 years, is still your best insurance choice.

*Let's Talk is an open letter to dentists from Dr. Mel Charendoff, the president of CDSPI.*

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*CFDE wishes to express special thanks to the publisher of this publication for its continued support.*



# Infection Control

## Infectious or not? – The Handpiece Controversy

*J. Hardie, BDS, M.Sc., FRCDC*

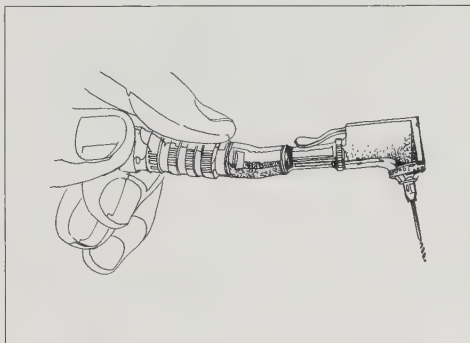
In late January 1991, the Calgary *Herald* reported the results of a U.S. study on the infectiousness of dental handpieces. The article was repeated in several newspapers across the country, generating headlines such as: "Researcher links dirty dental drills to AIDS, hepatitis B infections."

At about the same time, it was announced in Winnipeg that a member of the faculty of dentistry at the University of Manitoba, who was practising in the Northwest Territories and northern Manitoba, had died of a suspected AIDS-related illness. These events raised concerns – yet again – of a potential relationship between the practise of dentistry and the transmission of the human immunodeficiency virus (HIV). A discussion of this association is therefore warranted, with particular reference to the dental handpiece as a vector of disease transmission.

Obviously, the only infections that dental handpieces would be likely to transmit, if they are actually capable of spreading disease, are those found in the oral cavity. The majority of oral (and even respiratory) pathogens are bacteria, i.e. staphylococci, streptococci, diptheroids, pneumococci and, occasionally, tubercle bacilli. In addition, the influenza viruses and herpes viruses are not uncommon. All of these microorganisms may be released into the environment during talking, sneezing or coughing, or via the aerosols created during dental treatment, and all of them can contaminate dental handpieces. Such germs are of low pathogenicity, however, and unlikely to infect surgical wounds, intact skin and intact oral mucous membranes.<sup>1</sup> If this was not true, close contact, kissing and eating out would be dangerous, unacceptable social activities. Thus, even if the handpiece was contaminated by such pathogens, and supposing some of them were not removed by disinfecting the handpiece between patients, the risk of cross-infection would be minimal.

However, the public's current concerns do not relate to these pathogens, but to the blood-borne virus HIV and, to

a lesser extent, to the hepatitis B virus (HBV). It is pertinent to note that the reported instances of HBV transmission from dentist to patient occurred through direct contact with an infected dentist, and not through contact with contaminated instruments. Furthermore, the most effective method of preventing HBV transmission is universal vaccination.



HIV, like all human viruses, is incapable of reproducing outside of viable human cells. Once it is removed from its host, HIV becomes a waste product. Indeed, the simple act of blood drying will reduce by 90-99 per cent the mass of HIV within it, effectively reducing HIV's ability to be pathogenic.<sup>2</sup> This fact, combined with the low pathogenicity of HIV, explains why extensive studies have failed to demonstrate even a single instance of an individual contracting HIV from drinking glasses and eating utensils – or from bed sheets, toilets and bathing facilities soiled by HIV blood or blood products.<sup>3,4</sup> Simply put, waste products, including those containing blood, are unable to provide the conditions necessary to support the growth and survival of HIV.<sup>2</sup> For HIV to be transmitted, a direct, intimate exposure of the primary host's blood or semen to an appropriate portal of entry in the secondary host must occur. The virus cannot be contracted via an inanimate object acting as an intermediate vector. Furthermore, there is no evidence to substantiate the claim that HIV can be transmitted via aerosols.

Given these facts, it is clear, even without considering the heat generated

by the turbines in the handpiece, that neither the external nor internal surfaces of handpieces are conducive to the viability or propagation of HIV. Such knowledge, combined with the low pathogenicity of oral pathogens, casts doubt on whether dirty handpieces can spread disease at all. To many dentists, this may seem to be a heretical statement. However, dental rubber dam is an effective barrier against germs emanating from the handpiece, while water from the handpiece and the triple syringe, combined with high-speed suction, dilute the bacteria expelled from the handpiece by more than 10,000 fold.<sup>5</sup> In addition, oral mucous membrane is a physical barrier, and saliva a chemical barrier, to invasion by microorganisms located within, on or around the dental handpiece. These basic facts appear to have been ignored by Lewis and Boe, whose recent study on handpieces and the spread of disease has generated so much publicity.<sup>6</sup>

This investigation<sup>6</sup> revealed that a red food dye, injected into the water line of a dental handpiece, will be expelled from the handpiece. The authors suggest that it takes at least three minutes of continuous flushing to eradicate the dye from the handpiece, and since such flushing is seldom done in actual practice, they extrapolate that pathogenic contamination from previous patients may be expelled from the handpiece and infect subsequent patients. It must be stressed that this is a theoretical assumption made by the authors, as no microorganisms were involved in the study, no culturing techniques were employed and no consideration was given to the clinical conditions under which handpieces are used. The conclusions drawn by the authors regarding the infectiousness of dental handpieces are completely unfounded on the basis of their investigation. Nevertheless, the principal author (who does not appear to have a dental degree) has justified the need for handpiece sterilization based on his own surveys of the infection control practises of dental offices, combined with anecdotal reports from



dental supply companies, both of which suggest that less than one per cent of handpieces are adequately decontaminated.<sup>5</sup> This conclusion was reached despite the fact that, in previous experiments, the authors "sometimes failed to detect bacteria inside equipment when liquid disinfectants were supplied to the equipment externally."<sup>6</sup> The authors are convinced that the external wiping and flushing of handpieces are inadequate to prevent dental handpieces from spreading HIV, while forgetting that 0.08 per cent solutions of quaternary ammonium compounds do deactivate HIV.<sup>7</sup>

It appears, then, that Lewis and Boe have a misunderstanding about the ability of contaminated objects to cause infectious disease. Before disease transmission can occur, three essential factors must coexist:

1. a critical mass of viable pathogenic micro organisms;
2. an appropriate portal of entry;
3. a susceptible host.

While it is true that the inside of a dental handpiece may be esthetically unpleasant, Lewis and Boe have failed to demonstrate that the dental handpiece can act as the source of a critical mass of viable pathogenic microorgan-

isms, the first essential factor, and have therefore been unsuccessful in substantiating their claim that handpieces are a potent cross-infection risk in dental practice.

Their hypothesis is equally repudiated by the simple fact that although HIV has been present in North America since 1975, and males and females receive dental care in similar numbers, the ratio of males to females having AIDS is far from equal. In Canada, as of January 1, 1992, a total of 5,294 males and 289 females had been reported as having AIDS, or a male to female ratio of approximately 20:1. This would indicate that the chances of AIDS being transmitted during dental procedures are slim. (Obviously, a number of other considerations, notably the fact that HIV infection in North America is still found primarily in homosexual men and intravenous drug users, must be taken into account.)

Lewis and Boe<sup>6</sup> offer two reasons why – to date – not one case of dental equipment mediated cross-infection has been confirmed and reported in the medical literature. One, the current methods for detecting and reporting cross-infection in dentistry are ineffective and, two, the potential for cross-in-

fection in dentistry has been overstated. Their study does not substantiate the former concept, while historical evidence and infectious disease principles validate the latter.

Dr. John Hardie is the head of the department of dentistry at Vancouver General Hospital, 855 West 12th Ave., Vancouver, B.C. V5Z 1M8.

Reprint requests to Dr. Hardie.

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# Specialty Feature

## CAD/CAM in Dentistry: A Historical Perspective and View of the Future

E. Dianne Rekow, DDS, PhD

Computer-aided design and manufacturing (CAD/CAM) evolved from the engineering demands of the aerospace and automotive industries. Originally, the two functions were kept separate. CAD was generally used in drafting, while CAM made it possible to program and drive numerically-controlled machine tools.

In the early 1970s, as the technology's ability to increase productivity became apparent, the two functions were merged and combined CAD/CAM systems started to appear commercially.<sup>1</sup> At about the same time, a number of dental groups began investigating the possibility of developing a CAD/CAM system for prosthodontic applications. Each group began their investigations independently, however, and were largely unaware of their counterparts' activities until the mid 1980s.

Altschuler et al. focused on developing a data-acquisition system that could capture data from the mouth quickly, reliably, and with high precision.<sup>2-8</sup> This group's work has evolved into a 3-D surface imaging system. A prototype of the device is now being used by the U.S. Army and the U.S. Air Force.

In Japan, the earliest CAD/CAM research was undertaken by Tsutsumi and his team at Kyoto University. They developed an imaging system that projects multi-stripe coded patterns onto the surface being examined.<sup>9,10</sup> The changes in the patterns that are reflected off this surface (a dental cast, for instance) are then recorded by a video camera, and these data are processed to yield a 3-D surface map of the subject. An interactive CAD/CAM system is used to design a restoration, check for interferences with proximal and occluding teeth, and generate the machine tool paths needed to fabricate the restoration.

Tsutsumi's group is also investigating an array of new, machinable materials that could be used in dental prostheses, and is attempting to establish an index of machinability for materials. Their system is currently in the prototype stage.

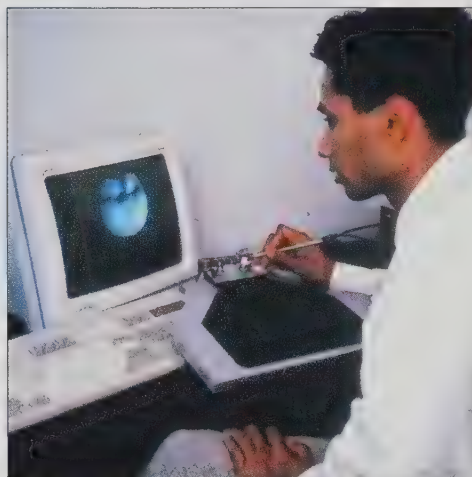


Fig. 1: The DentiCAD mechanical digitizer and computer system. (Everything we're doing now is PC based).

Other Japanese teams have also started to develop CAD/CAM systems. At Hyogo and Osaka, Kawanaka and Takahashi are investigating techniques to design and machine crowns.<sup>11,12</sup> Hikito and Uchiyama, working at Hokkaido University, use a coordinate measuring machine to obtain 3-D surface data of a crown form and preparation. CAD software is then used to design a restoration, and CAM commands are generated to fabricate the crown through a combination of spark erosion (also known as electric discharge machining) and milling.<sup>13</sup>

Other groups, lead by Kawabata at Kagoshima University,<sup>14</sup> Mikazaki at Showa University, and Fujita at Kana-gawa Dental College, are also developing prototype systems.<sup>15</sup>

The investigations of three other teams, each of which began its work in the early 1970s, have also evolved into modern dental CAD/CAM systems. Mormann and Brandestini's work led to the CEREC System (Siemens); Duret's system is known by his name; and Rekow's group, working at Minnesota, was instrumental in the development of the DentiCAD System.

### CEREC Developments

The first CEREC inlay was computer generated from a block of porcelain, at

chairside, in September 1985.<sup>16</sup> Today, just seven years later, approximately 1,000 clinicians use the CEREC system in their private practices.<sup>16</sup>

Designed as a direct chairside CAD/CAM restorative method for tooth-colored materials, the CEREC system is restricted to inlays, onlays, and veneers, and relies on a three-dimensional immediate optical impression method. It provides rapid chairside CAD/CAM fabrication and uses adhesive cementation techniques.<sup>17</sup>

The CEREC system consists of a three-dimensional intraoral camera, CAD software (now released in a 2.0 version), and a numerically-controlled grinding unit. A new operating system was released in early 1991, making the system extremely easy to use, much more user friendly, and eliminating the long learning curve that was inherent with the original system.

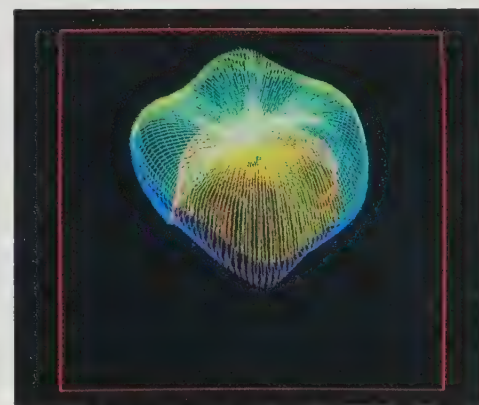


Fig. 2: A DentiCAD designed crown.

Clinical results, both *in vivo* and *in vitro*, were reported in a CEREC symposium held in May 1991.<sup>16</sup> Unquestionably, the system is capable of producing restorations that are clinically acceptable. However, these restorations should be limited to areas of enamel only, since bonds between the bonding composites and dentin are significantly more likely to leak and fail.<sup>18</sup> The major problems reported to date include hypersensitivity (in approximately 10 per cent of the cases), margin fracture over time (.05 per cent), bulk fracture, espe-





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cially if the isthmus reduction is insufficient (1.0-2.5 per cent), and recurrent caries (one case out of 831 restorations followed for two years).<sup>19-26</sup>

## Duret Developments

The first crown produced with the Duret system was placed during a demonstration at the International Congress of the French Dental Association in Paris in November 1985.<sup>27</sup> Between 3,000 and 4,000 crowns have been produced using this system in France and the United States.<sup>28</sup> It uses an optical impression, an interactive CAD design system, and a micro-milling machine.<sup>29</sup> Currently, work is under way to develop a jaw motion tracker capable of capturing functional motion data that can be incorporated into the occlusal design of the restoration.<sup>28</sup> While this work appears to be progressing, and information concerning the long-term survival of restorations is possible, very little has been published on the performance of the Duret system (clinical survival of the restorations, fit at the margins, etc.).

## DentiCAD Developments

The primary design criterion of the DentiCAD system was that the final margin fit should be at least equivalent to that of cast restorations (40-60 microns).<sup>30,31</sup> A number of data acquisition systems, including optically-based stereophotogrammetric and triangulation digitizing were investigated as this system evolved.<sup>32</sup> Unfortunately, these optically-based systems were not satisfactory, as it was impossible to obtain sufficiently high resolution of the data to ensure margins of 40-60 microns. Furthermore, all optical systems demand excellent retraction of the tissue around the margins.

Now, however, the DentiCAD system incorporates a miniature mechanical probe for data acquisition.<sup>33</sup> With this probe, no retraction is necessary, and the technique used for data collection is similar to that used during a clinical exam.

DentiCad is the newest system to become available. The first clinical crowns will be placed this year, with the first public demonstration scheduled for April 1992 at the Cologne Dental Exhibition. The DentiCAD system is capable of producing crowns and copings from titanium, alloys, machinable ceramics and porcelains, or composites. Its design and machining processes are fully automated, providing a crown within 30

minutes of the preparation's completion.

## Other Systems

Other systems that employ limited CAD/CAM technology have also become available. These include the Procera, Dux, Celay,<sup>32</sup> and Cicero systems.<sup>34</sup> The Procera, Dux, and Celay systems all require an expert user (dentist or technician) to prepare a pattern of the shape to be fabricated. That shape is then digitized with a mechanical probe, machine tool paths are generated, and the restoration is fabricated. Essentially, these are 3-D versions of the copy milling process used in reproducing keys.

With the Procera System,<sup>35,36</sup> a die is digitized, electrodes are machined, and the internal portion of a crown or coping is produced through electric discharge machining. Then a crown or coping is waxed and placed on the die. The wax pattern is digitized, electrodes are produced, and the restoration is fabricated. One major limitation of this technique is that the material used for the restoration must be electrically conductive. This means that very few dental ceramics and porcelains can be fabricated by this process.

With the DUX system,<sup>37</sup> a mechanical digitizer is used to capture data describing the preparation from stone dies. The software designs a constant-thickness coping. Currently, copings are being produced from titanium, but there appears to be no limitation to the materials that could be used. The greatest limitation of this system is that it does not produce any occlusal surface information; the copings are constant thickness only.

The CELAY system<sup>38</sup> is used to create esthetic inlays and onlays. An acrylic pattern of the restoration is created by the clinician, working directly in the patient's mouth. The acrylic is removed, digitized, and reproduced in machinable ceramic or porcelain. This system's major limitation concerns the extent of restorations that can be fabricated.

The Cicero (Elephant) system is aimed at producing esthetic CAD/CAM restorations.<sup>34</sup> It produces shells of ceramic that are then bonded to another ceramic or metal substructure. An extraoral laser digitizing scanner is used to collect information from a die. CAD software then recreates the mathematical model of the die, generates the occlusal surface, and creates machine tool paths. A refractory die is milled, reproducing the prepared tooth. Powdered

metallurgical or porcelain is sintered on the die and milled to the ideal form. Marginal fit is between 22 and 79 microns.

## Where Are We Going?

An array of CAD/CAM systems have evolved, but dental CAD/CAM systems are, without question, still in their infancy. Developments are continuing on both existing and new systems. With each iteration, the capabilities of these systems expand, and improvements in technique sensitivities, user friendliness, computing power, and the quality of the restorations are usually evident as well.

But the excitement generated by CAD/CAM is only beginning. Researchers are now focusing on integrating automated techniques for obtaining jaw motion data into the systems, so that functional paths can be incorporated into the occlusal designs. Others are investigating color and esthetic issues that, to date, have remained largely unresolved.

One of the greatest advantages that CAD/CAM offers for the future will probably occur in the development of new materials. Since materials do not need to be cast when CAD/CAM technology is used, different materials become alternatives. The most obvious of these is titanium. While difficult to cast, it can be machined with high precision. New materials are also being developed. Already, a machinable porcelain has been fabricated by Vita and a machinable glass ceramic has been created by Dentsply in collaboration with Corning. Other materials could potentially be engineered to more nearly match the mechanical and esthetic properties of natural teeth.

Another major area for future developments will involve the expansion of the technology to a broader array of restoration types.<sup>39</sup> Inlays, onlays, crowns, and copings have already been demonstrated clinically. Though some groups have been investigating short-span bridges, there have not been any reports in the literature describing their design or clinical success. Little work has been done in addressing the question of how long a span is feasible with a CAD/CAM system. Are the difficulties associated with very long-span one-piece bridges due to distortion in impression materials or due to loading and minute tooth movements during function?



## Summary

What can we look forward too? Lots of fun with new CAD/CAM systems that will enhance dentistry, providing quality restorations quickly. The evolution of an array of new versions of already available systems as well as altogether new systems will provide improved quality, expanded capabilities, and increasing user friendliness. And new materials will be more esthetic, wear more nearly like enamel, and strong enough for full crowns and bridges.

We can also look forward to lots of change. Because of the cost of CAD/CAM systems, many clinicians are likely to collaborate by sharing a single system. Laboratories and clinicians may collaborate as well, with data being gathered in the operatory and sent to a laboratory via modem. The fabrication would then be done by the laboratory.

Other changes that we cannot even predict are likely to occur in dentistry. Exciting times are here. Automation through dental CAD/CAM systems will, most certainly, change the profession. The impact of that change will only be known in the future. But as the future approaches, the systems and materials available to us will continue to evolve, improve, and enhance dentistry.

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# Specialty Feature

## The Future of Computers in Clinical Dentistry

Jack D. Preston, DDS

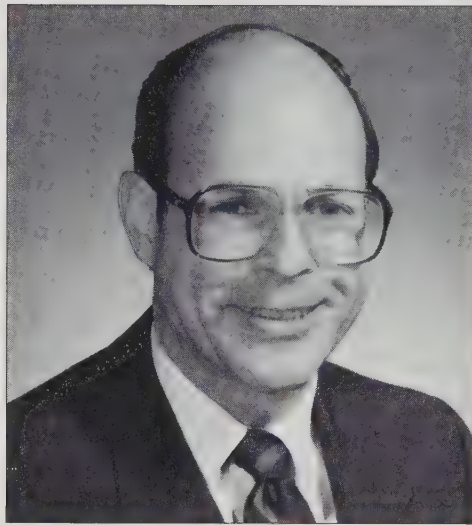
Over the past decade, the use of computers to facilitate and enhance the practise of dentistry has been slowly evolving. Today, an increasing number of products are finding their way into the dental marketplace. Beneath the surface of this gradual evolution, however, lies a pulsing giant that is ready to burst forth at the first beckoning of potential computer users. In fact, there has been tremendous activity within the computer industry to develop and refine products for both dental patient care and office management.

Computers arrived in the dental office as a natural extension of the database programs developed for business. The accounting procedures, as well as the organization of files, were much the same in dentistry as they were in other occupations. However, many of the business-related programs did not meet the specific needs of the dental office. The early systems required platforms that were underpowered by today's standard, and expensive.

Unfortunately, the evolution of dental office management programs was slow and often painful. Some of the companies that were major factors in the early stages failed, leaving users with incomplete and unsupported programs. However, as system developers learned more about what dentists needed, and the available hardware became more powerful, programs that are really quite magnificent evolved.

In addition, users have become more knowledgeable about what to look for in an office system, and more and more dentists and their staffs have become computer literate. Today, many feel that having a computer-based office management system is a necessity and not a questionable luxury.

We can expect clinical computer applications to follow a similar course of development. However, the time to accept and expand the multiplicity of applications will be compressed. Once the first systems are in place, new ones will follow more rapidly. The learning curve for dentists and allied dental personnel will therefore be steep in the initial



Dr. Jack D. Preston

stages of this evolution, but it should flatten out quickly. Furthermore, the programs are expected to become simpler, and the support they offer more transparent, that is, independent of any need for user interface.

A number of electronic applications are already available for clinical dentistry. Every practitioner should be constantly alert to new arrivals and to evolving products. This paper will briefly review the various applications that exist and offer some indication, albeit from a biased writer's vantage point, of what lies ahead.

### Types of Computer Supported Applications

Computer-supported clinical devices may be arbitrarily divided into six categories: patient record systems, video imaging, mandibular movement analysis, periodontal devices, digital radiography, and CAD/CAM. Underlying these visible, obvious headings are broader, and perhaps more important, conceptual considerations.

In evaluating any computer-supported system, this basic question must be asked: "What does a computer do better than the conventional method?" Is it faster, easier, more complete? Does it offer a method of capturing and/or

displaying data that the traditional method did not? What are the negative aspects? No system or program is without flaws, and to consider only the good points is to overlook the problems that will surface later.

### Computer-Based Systems and Applications

#### Computer-Based Patient Records

Although maintaining adequate patient records is tedious, it is also a practical, ethical, and legal necessity. Conventionally, the dentist charts manually – by looking at the patient and the patient's mouth, making the needed observations or measurements, and recording them in the patient's chart. This is monotonous, time consuming, and septic, as the dentist may inadvertently transfer oral fluids from the patient to the record. Ideally, an assistant is available to record the observations made and called out by the dentist. Rarely is there any check to confirm that what was seen was actually recorded, however.

The manner in which the data are displayed in a patient record is also important. Are all data clear and legible? Can a third party interpret them? Could the patient understand the data if, for example, a copy of the record were made available in an attempt to enhance communication?

Computer-based charting solves many of these problems.<sup>1-3</sup> Voice recognition<sup>4</sup> – the ability of the computer to respond to the human voice in the same manner as it responds to the keyboard or other input devices – will become more efficient and universal in the future. Display monitors will be larger, clearer, and offer truer color for oral video-photographs.<sup>5</sup> Imaging of the mouth will be used to simplify many manual entries – one picture can not only be worth 1,000 words, it can be unambiguous, and convey additional parallel thoughts. Color coding should assume universal meaning, facilitating



communication between consulting dentists and with third parties.

The legal implications of using these graphic records are still unresolved,<sup>3</sup> however. Until organized dentistry establishes a "limit of legality" for them, it is probably safer to print, sign, and date the original record and retain that hard copy.

A number of data-entry devices are now available, including the graphics tablet, the mouse and the touch screen. The eventual popularity of these devices will be based on their efficacy and ease of use. All of them are designed to simplify the process of "navigating" from one screen display to the next, and although many people will no doubt continue to rely on Windows (a brand of program management software), in the future, computer users should never be more than one screen away from the initial screen display.

For most dentists, the ability to create computer-based dental records will be a primary factor in their decision to use a computer in the clinical area. This system should be chosen with care, and with an understanding of how data may be exchanged between the treatment area(s) and the records office. All demographic information entered into the practice data base in the business office should automatically be transferred to the patient's clinical record. This means that all files must be compatible and able to interface without problems.

## Quality Assurance

A major advantage of establishing a relational data base through computer-based patient records is that it provides an opportunity to compile data relating to patient care. These data may relate to the practice of a single dentist, of all the dentists within a group practice, or, if properly compiled, to all dentists keeping similar data.

Furthermore, data can be acquired from a relational data base quickly and easily, providing many benefits to the practice. For example, if a dentist were asked today how long an average two-surface amalgam alloy restoration would last, it would be difficult to provide a valid answer. With the help of a dental practice data base, however, this information – and other such data – would be readily available. The local performance of two-surface restorations could then be compared to their performance in a broader area or to a national average. It would be easy to expand this concept to include many similar comparative measures of evaluation.

Hospitals in the United States and Canada must have ongoing quality assurance programs in place to achieve accreditation. Such requirements are not out of the question in dentistry. Quality assurance is good for the practitioner and good for the patient. A relational data base would help to establish a true standard of care, and provide support in the event of question or litigation.

## Integration for Insurance Claims/Reimbursement

When the computer-based patient record is integrated with the office management records, all the relevant insurance data must be easily and completely compiled. Ideally, communications with the insurance carriers, pre-approval and claims filing will be done electronically, expediting both approval and remuneration. This is already a reality in Canada, thanks to CDAnet and the Canadian Dental Association's standardized treatment codes and claims form. In the United States, it will be difficult to implement a similar electronic data interchange program until the insurance companies agree on common codes, procedures, and file formats. It is relatively safe to say, however, that this will occur at some point in the future. Ideally, future electronic claims technology will allow the digital transmission of radiographs.

## Periodontal Devices

There is no question that an accurate periodontal recording is an essential part of the patient record. This process can be time consuming, and the transfer of information between the dentist and dental assistant is tedious. Fortunately, a number of electronic recording devices are now available and others are being developed.<sup>6-8</sup> It is fair to assume that periodontal recording devices, capable of noting all mechanical measurements (pocket depth, recession, mucogingival adequacy, etc.), will be integrated into the modern dental practice relatively soon. Who is to say that devices to identify pathogens and chemical factors are not far behind.

## Mandibular Movement Analysis

Few topics have been as controversial in dentistry, or the subject of so many contributions to the literature by the proponents of one therapy or another, as the accurate diagnosis of my-

fascial pain and dysfunction. Most attempts to diagnose and treat such disorders rely on qualitative evaluation, and the experience of the therapist. To arrive at a diagnosis and to document the efficacy of therapy, some quantitative measures of the patient's function are desirable. In the absence of measurable data, the therapist must rely on general observations of the available signs and the patient's description of symptoms. Narrative records lack precision, and comparisons based on such records are inexact and not documentable.

A computer record of myographs, sonographs, and mandibular motion (Biopak, BioResearch Inc. Minneapolis, Minn.; Mandibular Kinesiograph, Myotronics Inc., Seattle, Wash.) aids the therapist by providing a graphic and quantitative record.<sup>9-11</sup> The graphic display of the range and course of mandibular motion allows observation of the individual elements of mandibular movement and the comparison of multiple movements.

Sonograms record vibrations in the TMJ resulting from mandibular movement. These data are displayed, analyzed, and stored for later comparisons. Electromyograms, recorded using surface electrodes, establish comparative bases for the evaluation of different muscle groups. Comparing these electromyograms to baseline norms and records made over the course of therapy can be a valuable method of evaluation.

One can assume that electrodiagnostic devices will become usual and customary in the diagnosis of TMJ pathoses, and that their use will be validated scientifically to the satisfaction of even the most recalcitrant critics.

Similarly, as devices such as the T-Scan (Tech Scan, Boston, Mass.)<sup>12</sup> become more refined, they will provide more detailed information for occlusal analysis. And in the future, as knowledge bases are built and applied, the clinician using these devices to record data on mandibular motion may have increased diagnostic support available. Such applications of "expert systems" are one of the strengths of the computer-based clinical devices, and this support will be broadened.

## Imaging

Probably no other computer-based clinical programs, devices and systems have been as broadly accepted in dentistry as those for displaying patient video images. Additionally, the display and modification of such images to plan



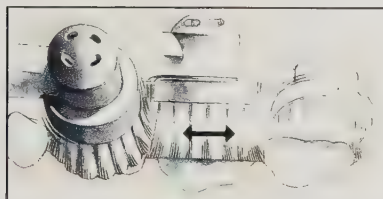
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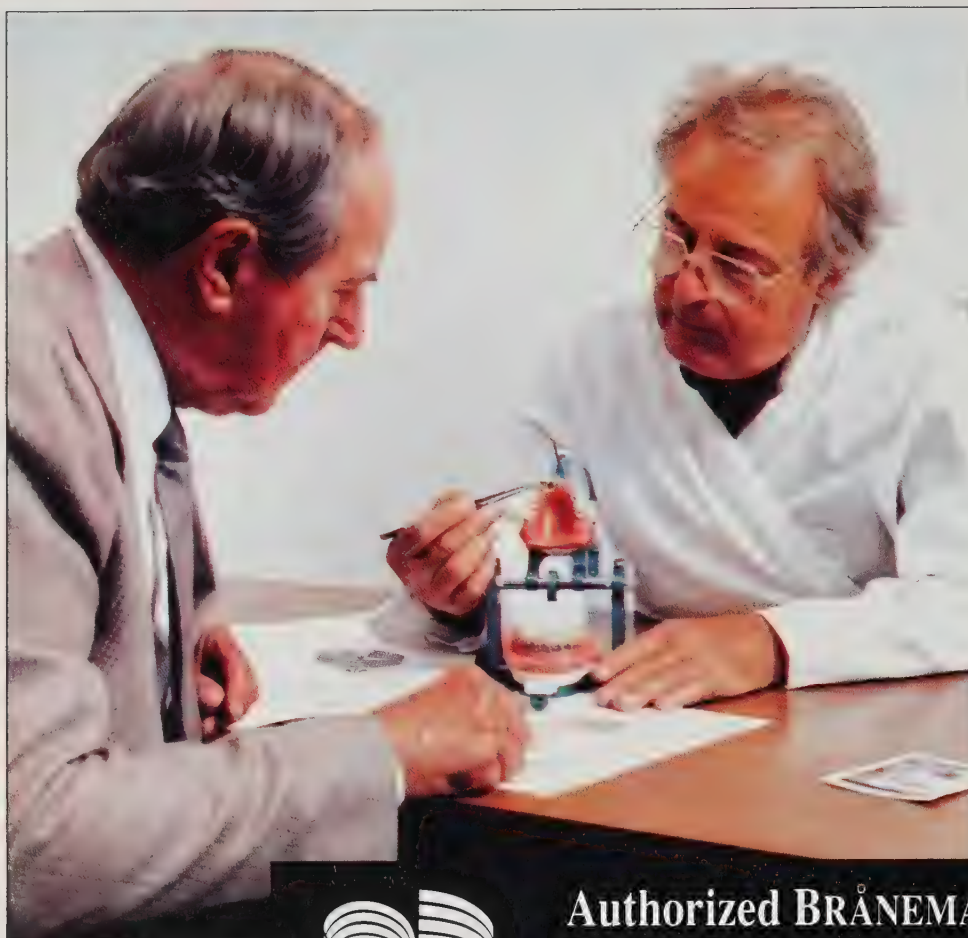
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and demonstrate the desired outcome of therapy has proven very effective. It is safe to say that the intraoral camera will become a standard part of the dental instrumentation. In the future, cameras will be adapted to particular viewing needs, from imaging all of the occlusal surfaces or an arch, to looking within a root canal or into a gingival crevice for diagnosis and therapy. The images obtained will become part of the patient's record. Furthermore, communication with the dental laboratory will be more visual, and images will be electronically conveyed. Rather than working through a direct view of the oral cavity, dentists may follow the lead of physicians working in other small orifices, and use an intraoral camera to view their task indirectly on a monitor.

## Image Processing Systems

Usually called "esthetic imaging systems," these devices are becoming more common,<sup>13-15</sup> and will continue to do so. As this occurs, the technology will become increasingly easy to use and offer better image storage facilities. Patients are already becoming more aware of the advantages of these systems, and one may expect that they will come to expect imaging services as part of the routine diagnostic procedure.

## CAD/CAM

Unfortunately, CAD/CAM (computer-assisted design/computer-assisted manufacturing) is still a futuristic concept for many dentists. However, considering the level of acceptance that CAD/CAM now enjoys in engineering design and machine fabrication, a similar expansion in dentistry seems likely. The one factor that must be addressed is the development of materials that offer dentists all the advantages of current fabrication techniques, but are machineable. This is a major issue, and will require both innovation and the development of currently unexplored concepts and materials.

## Digital Radiography

Digital radiography may have the greatest potential to cause major changes in the diagnostic procedures dentists use. "Filmless radiography" produces an immediate image that not only removes the time, mess, and contamination of conventional film processing, but allows enhancements to augment current radiographic procedures, and may provide quantification

currently not possible.<sup>19-22</sup> Although current systems are intraoral, it is certain that extraoral radiographs are the next, and imminent, step. Digital radiographs will make it possible to obtain intraoral clarity with extraoral techniques, will allow three-dimensional reconstruction (thus increasing the dentist's opportunity for proper interpretation), and reduce the amount of ionizing radiation that the patient receives. Initially, these systems will be expensive, but eventually digital X-ray systems will be found in most, if not all, dental practices. Once digital radiography is in place, the other components for a true "work station" (an integrated, all-purpose software/hardware interface) will be added rapidly.

## Physical Modifications of the Environment

How will all of these new devices affect the design of a dental office? There is no doubt that the changes will be significant. Both the devices used and the space in which they fit must be ergonomically engineered. Dentistry cannot simply insert these devices into the current office environment, it must revamp that environment to accommodate them. This cannot be a haphazard process. All areas of the practice – infection control and electronic systems, for example – must work together.

In the future, the computer storage and display of radiographs and records will remove paper and hard copy from the operatory. It is likely that two monitors will be needed – one for the patient and dentist, which will be mounted on or above the chair, and one large, specially-designed unit recessed into the wall. This unit will display radiographs and the patient's chart. A keyboard equipped with a disposable cover will probably be needed for data entry and information retrieval, and a graphics tablet for progress notes will be necessary as well. The intraoral camera will probably be accessible in the same console as the dental handpiece, sharing space with the imaging camera for CAD/CAM systems, and, perhaps, the laser handpiece.

The dental systems of the future will probably be based on Windows or an equivalent software program. All of the devices available to the dentist will be displayed in the Windows menu. The dentist will have a small microphone and wear a speaker to listen to the computer's responses. Peripheral devices must be modular, and easily share

the computer's operating system, as needed.

The costs of a setting up a comprehensive electronic dental office may have to be shared by multiple users, and it is likely that the solo practice, as we know it, will not survive. Practices clustered around a computer serving centre will retain practice autonomy, while sharing services. Groups will become more common.

## Summary

It is essential that computer manufacturers and system developers increase their cooperative efforts to establish and maintain standards. Individual, stand-alone systems will not survive, and error-prone integration will prevent progress. File formats – whether graphics or text based – must be completely and seamlessly integrated between users. This has not occurred in other aspects of computer application. Can we expect it to in dentistry? We must. The profession will only reap the true benefits of computerized practice if CDA, ADA, the insurance carriers, manufacturers and developers are willing to sit together and agree to cooperative efforts. Such cooperation is imperative. While initially altruistic, it will be commercially essential in the long run.

For many applications, the ability of a computer-based system to quantify information adds a new level to diagnosis.<sup>23-27</sup> Coupled with this diagnosis support knowledge bases will provide dentists with added sophistication and expanded competence in diagnosis and treatment. It is reasonable to assume that the patient's relevant medical data – medications, status of principal organ systems, etc. – may also be made available electronically.

Practice performance data, the legality of entries, and the compilation of and access to national data bases must all respect the patients' and dentists' rights and privacy, while serving society's health care needs. There are some very large issues ahead. Developing the hardware is the easy part. The software is more complex and, as it is specifically designed for dentists, more expensive. The profession is too small to share these costs over the available customer base – limiting the number of vendors that can survive. The legal and moral issues may be the greatest ones, however. It is conceivable, too, that computer-based recording, diagnosis, and therapy will change the standard of care in the developed nations. There are exciting and challenging times ahead!



**Dr. Jack Preston** is the chairman of the department of oral and maxillofacial imaging at The Don and Sybil Harrington Foundation, and a professor of esthetic dentistry at the University of Southern California School of Dentistry in Los Angeles, California.

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# Specialty Feature

## Lasers – The New Wave in Dentistry

P. Ralph Crawford, BA, DMD

*This is not a scientific paper, nor is it intended to be. It is simply a report on three general practice dental offices that use lasers on a daily basis.*

*Lasers are now finding their way into dental offices – 40 units have been sold in Canada so far – and have caught the imagination of the media. Therefore, the *Journal* believed it would be an appropriate time to investigate exactly what kinds of laser-based services are being offered to Canadian patients.*

*For an in-depth scientific review on lasers, readers are referred to an excellent article, "Dental Lasers and Science," by Drs. Kenneth L. Zakariasen and Douglas Dederich (*J Canad Dent Assoc* 57:570-573, 1992).*

A review of dental history will soon make it clear that a surprisingly small number of innovations have dramatically influenced dental practice during the past 150 years – perhaps no more than 12. These include: nitrous oxide, Horace Wells, 1844; vulcanite, Goodyear, 1851; X-rays, Roentgen, 1895; amalgam, Black, 1895; novocain, Einhorn, 1904; the casting machine, Taggart, 1906; fluoridation, developed from McKay and Black's "Colorado Stain" studies in 1915; agar-agar compounds, Poller, 1925; air rotor, Borden, 1958; composites, Buonocore, 1967; and the first titanium oral implant, Branemark, 1965.

Today, many believe that the laser will be (or already is) the next big "breakthrough" to affect the delivery of dental services. The process for creating laser energy, known as the stimulated emission of radiation, was first proposed by Albert Einstein in 1917. It wasn't until the 1950s, however, that two American physicists, Schawlow and Townes, outlined the first working principles of Light Amplification by Stimulated Emission of Radiation (Laser). In 1960, another American physicist, Theodore Maiman, observed the first laser action in solid ruby.



*Laser dentistry in living color*

From the beginning, many researchers believed that the potential of lasers was restricted only by the imagination. To date, laser technology has become commonplace in industry, communications, business, medicine, and the military.

The first investigations into possible dental applications for lasers were initiated in the early 1960s by Stern and Sognaes at the University of California. Subsequent investigators, in addition to exploring the anesthetic and sterility properties of lasers, looked at their potential to assist in the cratering and glazing of enamel and dentin, decay removal and pulpal damage repair.

Still, even just a few years ago, lasers were relatively unknown in dentistry. That started to change in 1991, when four laser manufacturers exhibited their products at the American Dental Association meeting in Seattle, and at last count there were six companies in the dental laser business.

Lasers for dental use fall into two categories – the neodymium-yttrium-aluminum-garnet laser (Nd-YAG, commonly called the "YAG"), and the carbon dioxide laser (CO<sub>2</sub>). The two differ essentially in the wavelength or frequency of the laser beam and the degree to which its energy is absorbed. The CO<sub>2</sub> laser, with a power output of 25 to 30

watts, operates at a wavelength of 10.6 micrometres, while the YAG, with an output of three watts, has a wavelength of 1.06 micrometres. Water and organic material absorb the CO<sub>2</sub> laser's wavelength at a high rate, which makes this type of laser ideal for many soft-tissue applications, but its efficiency and safety for hard-tissue applications are poor. For this reason, and because the CO<sub>2</sub> laser can only operate on an articulated arm, the YAG is the laser of choice in most dental offices.

### William and Terry Myers

In 1987, Dr. Terry Meyers, a 1973 graduate of the University of Detroit's School of Dentistry, and his brother William, an ophthalmologist who was one of the first Americans to use a laser for eye surgery, developed the first practical dental applications of laser technology. Much of their work has been used by American Dental Laser, which markets a Nd-YAG laser manufactured by Sunrise Technologies of California. The Myers brothers remain closely aligned with American Dental Laser – William is chairman of the board and Terry serves as a consultant in the areas of dentistry, clinical research and training. All three of the dental offices interviewed by the *Journal* utilize an American Dental La-



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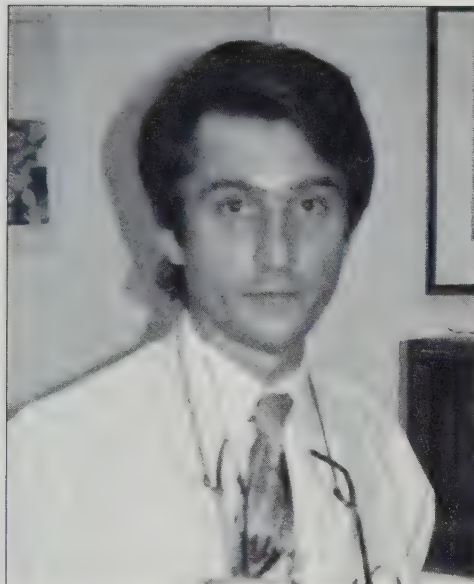
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ser Nd-YAG, which currently retails for around \$70,000.

## Dr. Thomas Pekar, St. Catharines, Ontario.



*Dr. Thomas Pekar, St. Catharines, Ontario, demonstrates his Nd:Yag laser and Perspective intraoral camera.*

Dr. Tom Pekar, a 1983 graduate of the University of Western Ontario, has been using a laser in his general dentistry practice since 1989 – he claims to have been the second dentist in Canada to own an American Dental Laser.

Forced to relocate his practice at a time when the country was moving into a recession, and knowing that patients sometimes avoid dental offices because of their fear of the dentist's drill and needles, Dr. Pekar believed the laser would fulfil several needs. Patients who were not actively seeking dental care could perhaps be encouraged to do so, and his office would stand out in a depressed dental market place.

Today, the laser is the focal point of Dr. Pekar's practice.

An active participant in laser study clubs, he has presented clinics at dental meetings and has earned an associate appointment with the University of Connecticut in laser research. His office sign reads "Family and Laser Dentistry," and his referral practice continues to grow.

For the purposes of this article, Dr. Pekar demonstrated the laser's use in desensitization and decay removal. It was interesting to note that each of the patients he treated were in the office specifically because they had heard that dental treatment was possible without a needle or drill.

One patient had been suffering from exposed and sensitive dentin for several years. This was her second visit to the practice for desensitization, one of the laser's most effective uses according to Dr. Pekar. The procedure is simple and quick, and in many cases only one visit is required (sometimes, a second visit is needed about two weeks later). Equally important, the treatment is usually effective for several years. It is thought that the laser closes the dentinal tubules.

Another patient, a young man in his early twenties, was obviously uncomfortable in the dental office. He admitted that he had undergone all previous dental treatment without anesthetic. "I couldn't stand a needle," he said, "I just white-knuckled it."

Fortunately, this patient only required a couple of occlusal restorations on molar teeth – one had slight decay and the other recurrent caries around an existing silver amalgam. Dr. Pekar took his time to put the young man at ease and explained how the laser worked. He simulated the laser's action by removing a printed word from a piece of paper without damaging the paper itself.

Operating with rubber dam, Dr. Pekar removed the decay from the infected molar by moving the laser beam over the area of decay and into the occlusal grooves. Periodically there were flashes of light from the laser tip and a "popping" sound. Explained Dr. Pekar, "When I see a flash I know I am in decay. Demineralized enamel and dentin respond differently to the laser."

Once he had removed the decay, Dr. Pekar used a standard round bur to shape the preparation. The patient was monitored and questioned repeatedly about his comfort. (Dr. Pekar indicated that the laser produces a certain degree of anesthesia.) When he was satisfied with the preparation, Dr. Pekar restored the tooth with an etched composite.

Moving to the tooth with recurrent decay around an existing amalgam, Dr. Pekar removed both the decay and the amalgam with the laser. He worked the laser along the amalgam margins, moving back and forth between the amalgam and occlusal grooves as the patient indicated discomfort (the lased amalgam generated more heat than the decay). Once the old restoration and decay were removed, the air rotor was employed for final cavity preparation – again without anesthetic.

Dr. Pekar explained that, in many cases, lased dentin does not require a base. The lasing of exposed dentin

closes the tubules, and lased dentin is harder than non-lased dentin. In addition, a side benefit of the laser in decay removal is thought to be the disinfection of the preparation.

An interesting concept advanced by Dr. Pekar is that the laser can change the criteria for making a diagnosis of whether decay exists or not. Whether to fill or to watch, in other words. He demonstrated this on the patient's upper second bicuspid. Suspicious that there was decay on the mesial pit, but not on the distal, he moved the laser back and forth over the tooth. Because the Nd-YAG wavelength of only 1.06 microns is not absorbed by healthy enamel, it did produce a "flash" over the non-decayed distal groove, but did so over the carious mesial. To Dr. Pekar, this was proof enough that the distal should be filled.

## Laser Guidelines

When asked about the guidelines issued by the U.S. Food and Drug Administration, CDA, the American Dental Association and the American Academy of Periodontology – which all state that laser use should be restricted to soft-tissue applications – Dr. Pekar said he was quite aware of these recommendations, but was convinced that his treatment of hard tissue was well within safe limits. He meticulously documents all treatment – in fact, he videotapes every laser procedure – and is quite ready to share his results. In hundreds of restorative procedures and subsequent follow-ups, Dr. Pekar has found less tooth damage and less or equal pulpal damage as would be found in teeth restored by routine air-rotor drilling.

Not that Dr. Pekar doesn't use the laser for soft tissue treatment, too – he routinely applies it to periodontal curettage and other soft-tissue management, including tissue retraction. Dr. Pekar does not employ a dental hygienist, but says that he can reduce pocket depths by as much as four millimetres with normal hygiene management and laser curettage. He had one caution, however: "Laser curettage is not for everyone. It is like all preventive procedures – you need a highly motivated patient."

## Intraoral Camera

In conjunction with the laser, Dr. Pekar routinely uses an intraoral camera, Dentsply's Perspective Dental Imaging System, which retails for around \$20,000. With it, he is able to graphically – and in living color – explain to his patients any and all dental proce-



dures. He finds the camera to be a useful patient educational tool, and admits it provides great public relations and practice building spinoffs. As indicated previously, Dr. Pekar videotapes all procedures and retains the tapes for his dental records. He often gives patients photos of their periodontal improvement for motivational purposes. "You would be surprised how many take them home and hang them on the fridge," he said.

### **Dr. Raymond Myers, Regina, Saskatchewan.**

Dr. Ray Myers, a 1984 graduate of the University of Saskatchewan, first learned of the laser at a dental supply company seminar about three years ago. When asked what had prompted him to spend almost \$70,000 to get involved, he said, "I felt it was the wave of the future. By getting in at the beginning I would be at the forefront when (the laser) takes over from the handpiece."

At this time, Dr. Myers is the only Saskatchewan dentist using laser dentistry. He maintains a shopping mall practice in the heart of Regina's business section. There, he employs a dental hygienist, three certified dental assistants and an office manager.

American Dental Laser sent representatives up from Detroit to introduce Dr. Myers to their Nd-Yag. Finding that the laser was technically sensitive, it took him about six months to feel comfortable with the device and to find out what it could and could not do. Now he doesn't know how he could get along without his laser.

"The laser was out for repair for four days and I really missed it. I use it at least a half-dozen times a day and pick it up like someone would pick up a handpiece."

Like Dr. Pekar, Dr. Myers uses the laser for decay removal — he finds it slow, and usually still has to go in with a round bur — and lases the pulpal floor of his preparations. Admitting it is empirical, Dr. Myers says the laser gives a glaze and hardness to the dentin, sterilizes the area and reduces sensitivity.

Dr. Myers occasionally uses retraction cord, but depends solely on the laser for gingival "troughing." The fact that this technique is "bloodless" is a tremendous asset, he says. He also lases completed crown preparations to reduce post-restorative sensitivity.

Other areas where Dr. Myers routinely uses the Nd-YAG are periodontics, pedodontic pulpotomies and endo-

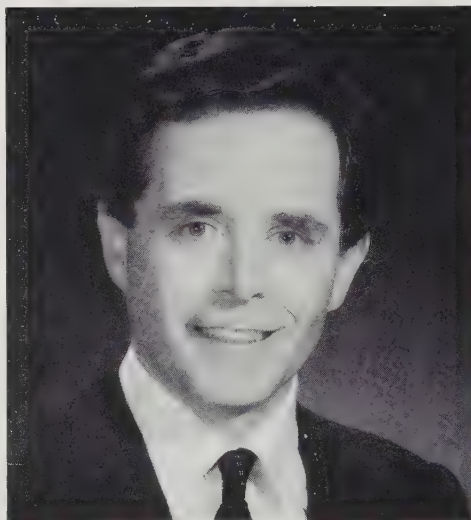
dontics. He has found that laser curettage works very well for patients who do not want periodontal surgery — those with four to six millimetre pockets. He can reduce the pockets and maintain the patients by seeing them twice a year. However, Dr. Myers admits that he's obtained mixed results with laser desensitization.

At the outset, his patients undergo regular appointments for scaling and curettage. The laser is used for subsequent scaling appointments. In addition, Dr. Myers no longer uses formocresol in pulpotomies for children, as he has found that the laser works exceptionally well in this area.

In endodontics, the laser can eliminate a draining sinus and can disinfect any root canal larger than a number 30 — the laser is limited by size. Dr. Myers also uses the laser as a condensing aid with the warm gutta percha technique.

Buoyed by his enthusiasm for the laser, Dr. Myers predicts that in five to 10 years it will be a common item in every dental office. He says that advances are being made in laser technology that will make endodontic accessibility easier, and sees the day when lasers will cut all tooth structure as well as fusing cracks in teeth that, up to now, are destined for extraction.

### **Dr. Ron Porth, Abbotsford, B.C.**



*Dr. Ron Porth  
Abbotsford, B.C.*

A 1968 graduate of the University of Manitoba, Dr. Porth has used the American Dental Laser in his office for over two years. His Abbotsford practice is about 60 kilometres from Vancouver, and the only one in the area with a dental laser.

Like Drs. Pekar and Myers, Dr. Porth

uses his laser on a daily basis. For the first year, he used it for "everything possible," but now restricts its use to procedures he feels comfortable with. "Like everything else in dentistry, the laser is only an instrument and is not intended to be a magic wand," he said.

Dr. Porth shares Drs. Pekar and Myers's enthusiasm for laser curettage in periodontics, and uses it 95 per cent of the time for minor periodontal surgery, including gingivoplasties, curettage and frenectomies. In addition, he has found the laser to be effective for desensitization, and will use it prior to scaling. Likewise, the desensitization effect of the laser can be beneficial following crown preparations.

Unlike Dr. Pekar, Dr. Porth does not use his laser for decay removal, but does use it as anesthesia for incipient lesions and in dentin etching for class I composites. He finds the laser effective for pulpotomies, but to date has not attempted endodontics. This may change after he takes delivery of a new 200-micron fibre, which will make laser endodontic procedures as fine as can be obtained with a number-15 file possible.

Dr. Porth extolled the value of the laser in treating aphthous ulcers and herpes labialis (cold sores). He cited several dramatic cases where, "We seemed to break the cycle," and bring relief to patients who had suffered over long periods of time.

### **Practice Builders**

Based on the experiences of Drs. Pekar, Myers and Porth, the *Journal* believes that laser dentistry has great potential. Each dentist revealed that the laser had enhanced the "busyness factor" of their practice.

In the past few years, many general-consumption newspapers and magazines have published stories on the laser, and almost all of them indicated that it will replace the dental drill and eliminate needles. It is no wonder, then, that many patients deliberately seek out a laser dentistry practice.

Each of the three dentists interviewed by the *Journal* have also been interviewed by the media on more than one occasion. But in all fairness, they cannot be blamed for some of the media's exaggerated statements.

### **Research**

Scientific investigations of laser applications have accumulated a wealth of data, which has come from research centres throughout the world. Re-



spected symposia and journals – national and international – regularly present the latest findings on how the laser is being used in new and innovative ways to treat traditional dental problems.

Each of the dentists interviewed, Drs. Pekar, Myers and Porth, encouraged any dentist interested in the laser to delve into the literature, attend laser courses and communicate with laser academies or associations before actually investing in hardware.

Readers are again advised to read Zakariasen and Dederich's article in the July 1991 issue of the *Journal*, with particular reference to their summary:

*"...extensive scientific investigation must form the base of our profession, it must be an ongoing, continuous process, and laser dentistry must be developed through extensive scientific inquiry – as all our treatment modalities should be...Lasers do have far-reaching potential for application to dentistry. We, as a profession, must insist that such laser development is done properly, not foisted upon us based on anecdotal reports and incomplete research."*

### Be Cautious!

In August 1990, CDA's board of governors issued a statement on lasers. The statement clears the way for soft-tissue laser applications, but warns that hard-tissue applications are in the initial stages of development and clinical research.

A front page statement that appeared in the American Dental Association *News* on August 19, 1991, is also very cautionary: "They're touted as being exceptionally mobile, unusually fast and practically bloodless, but just how safe are dental lasers? Well, it depends. According to the U.S. Food and Drug Administration and dental officials, they're fine for soft-tissue procedures such as gingivectomies and surgery. But go beyond that, into hard-tissue applications such as etching enamel and removing caries, and you're out on a limb."

In a position paper to members, the president of the American Academy of Periodontology, Dr. William Becker, stated: "There are not enough data available to support all the claims made by those selling and marketing lasers to the profession and the public. Unfortunately, the claims of reduced discomfort make this an attractive alternative to

patients because it plays on their fear and pain. However, no one can be sure

the procedure is effective until it is adequately tested."

### CDA Statement on Lasers

The Canadian Dental Association recognizes the utility of medical lasers in soft-tissue applications, but cautions that hard-tissue applications are in the initial stages of development and clinical research. It should be understood, in particular, that at this point in time, lasers do not represent a viable replacement for the high-speed drill.

Dental practitioners choosing to employ lasers must have appropriate training and orientation to the equipment. Marketing of medical lasers in Canada is regulated by the Health Protection Branch of Health and Welfare Canada. Manufacturers must show compliance with Section 24 of Medical Devices Regulations. It should be noted that a certificate of compliance from Health and Welfare Canada does not represent approval of a device's clinical efficacy.

The specific use and application of lasers in dentistry falls under the authority of the individual provincial licensing authorities.

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## Clinical and non-clinical dental sciences: An alliance of necessity

Hossam E. ElBadrawy, DDS, HDD, MS

Most academicians are painfully aware of what the phrase "publish or perish" implies. In recent years, dental faculties appear to have based tenure and promotion decisions almost exclusively on whether a candidate's research activity will lead to future publications in scientific journals.

But is this emphasis on publications really necessary? Is it fair to overburdened staff? And how can dental faculties facilitate this process for their members?

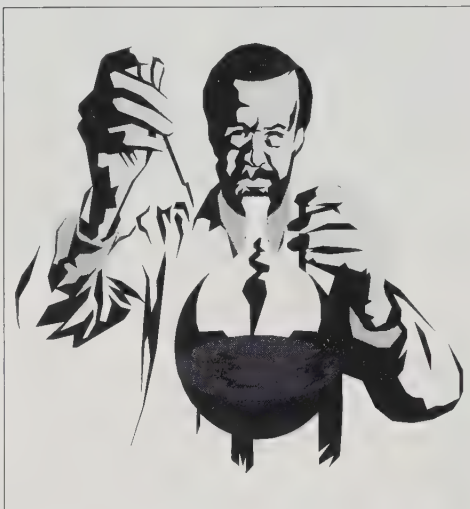
A majority of academicians, some begrudgingly, admit that research and publications are indeed necessary. The dissemination of knowledge cannot be separated from its acquisition, and the teaching process is really part and parcel of the investigative process.

In fact, the cumulative efforts of hundreds of investigators in both university circles and industry have resulted in a new "golden age" of dentistry. It's an age where caries is on the decline and new developments in dental materials have raised cosmetic dentistry to a true art form – as well as challenging (and changing) previously held concepts of cavity design.

Academicians have a unique role in society, one that carries with it grave responsibilities. These include our responsibility to be at the forefront of the investigative process, which should ultimately lead to the growth of a healthier society. And, if we agree with this concept, we must also accept that the "publish or perish" philosophy has at least some degree of validity.

This raises a second question: Is the publish or perish concept fair? Like most philosophies, it cannot be applied to all situations and circumstances equally. For instance, is it really fair to compare the research capabilities of a university division that has two full-time staff members to a similar division at another institution that has a complement of five or more full-time staff members. The answer must be a resounding no.

Clearly, the two staff members at the smaller division must cope with a



greater burden of teaching and administrative responsibilities than their five counterparts at the larger division. In fact, it is fair to assume that they are often forced to choose between meeting pressing commitments or indulging in research activities that would lead to publications. Obviously, there has to be a loser in this equation, and it's usually the academician, who must make the painful sacrifice of putting his or research activities on the back burner.

This situation does not occur in larger, but otherwise equal, divisions, since the duties of the division are shared by a greater number of staff members. As a result, each individual staff member has more time to devote to research activity. Additionally, the combined input of the division's many staff members – each with different areas of interest and expertise – will broaden its overall knowledge base, stimulating and aiding collective research activities.

In fairness, it appears that the publish or perish concept should not be applied to the same degree in all situations. Recently, the pendulum may have swung too far to the left. It may be time, once again, to give due acknowledgement to excellence in teaching and administrative abilities, so that these very important functions do not eventually suffer neglect in a mad rush to publish.

What, then, is the solution? Again,

no easy answers present themselves, and no one act will allow us to publish, teach and administer without the commitment and the will to do so. Still, if our objective is to streamline and facilitate this process, a solution that could prove beneficial might be to rethink the present and traditional dividing lines between departments.

In recent years, there has been a shift among Canadian and U.S. dental faculties toward the amalgamation of a number of speciality areas under the umbrella of a single department, with one department head and several divisional heads. For instance, at the University of Alberta, the department of stomatology comprises the divisions of diagnosis, surgery, orthodontics, pediatric dentistry, periodontics and radiology. This amalgamation makes sense from an administrative perspective in cases where each division has no more than one to three members. The department head has greater flexibility in dealing with the administration of the various divisions in regards to budgetary and other concerns, while each division, as part of a larger whole, has stronger representation on faculty councils and in other interdepartmental matters.

Traditionally, departments have



been structured so that the clinical divisions are amalgamated into single departments, with non-clinical and basic sciences similarly grouped into a single department (usually designated as the department of oral biology). At first glance, these boundary lines appear quite logical, providing clear separations between the clinical and non-clini-



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*Dr. Pam Zakarow*  
*Oshawa, Ontario*

*Dr. Pam Zakarow:*  
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cal specialities.

At second or third glance, however, divisions along these lines may appear much less desirable, especially from the standpoint of research productivity. In fact, they probably strengthen and reinforce the feelings of isolation that may be experienced by members of the non-clinical divisions within dental faculties. This is truly unfortunate. Most of the patient contact and data that could be effectively utilized for research purposes is readily available to members of the clinical divisions, while the research "orientation" is probably more defined among the non-clinical members of the faculty. Additionally, the non-clinical members often have more time to devote to the investigative process, as their schedules are not usually burdened by clinical teaching.

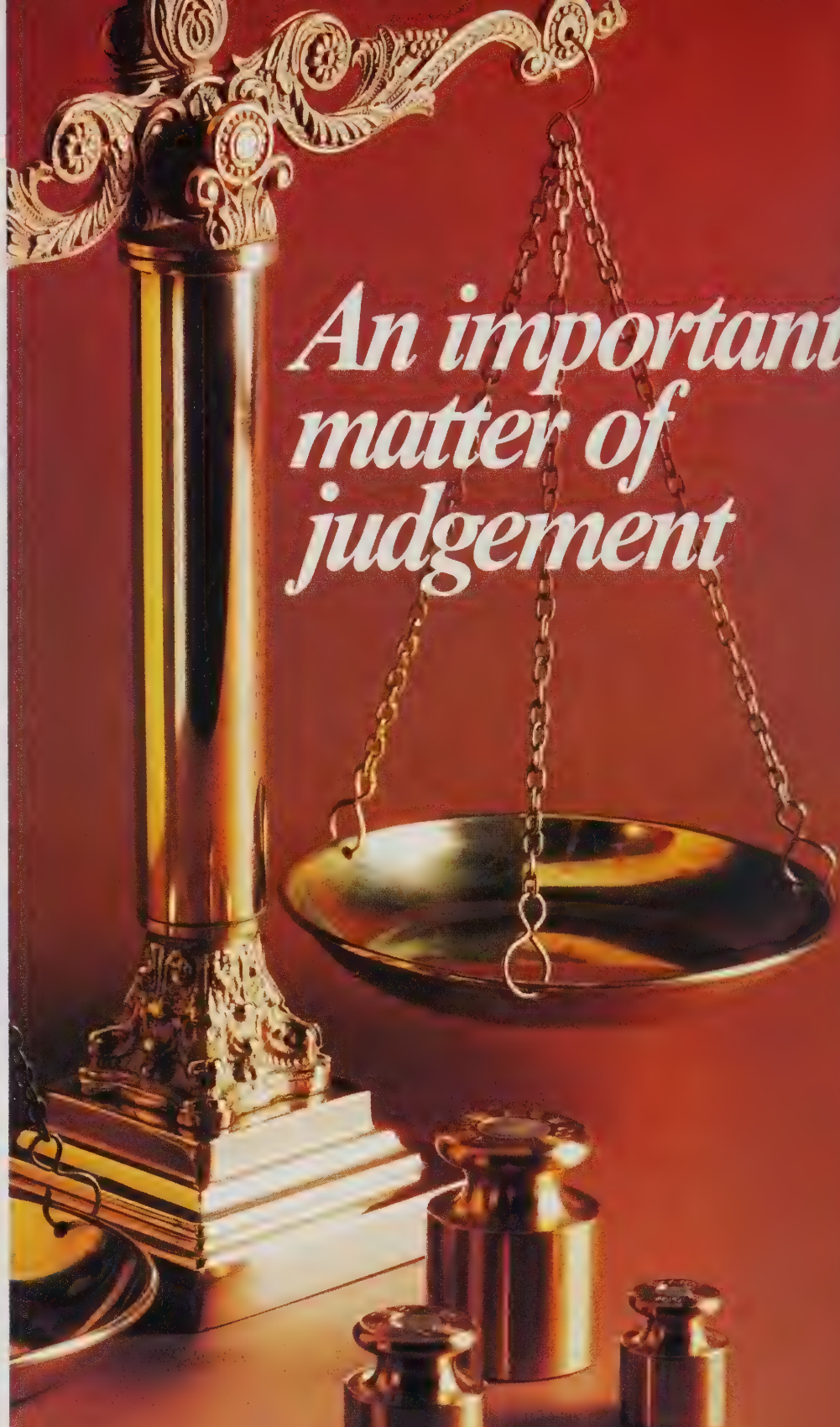
If we are to achieve a maximum utilization of our resources, then perhaps consideration should be given to an amalgamation of divisions along different lines, with each clinical department also comprising one or more non-clinical divisions. These non-clinical divisions would add a new dimension to each clinical department, bringing expertise and a research orientation to members of the whole department, as well as ending the isolation that is often experienced by non-clinical divisions. Each department would then have its own division of research within its administrative structure.

As stated, no one act will guarantee scholarly thought and activity. However, the expertise, the resources, the data, the commitment and the will are all available within our dental faculties. A facilitation of the investigative process is really all that is lacking, especially for those divisions with a small complement of staff members. Perhaps the suggestion presented here may contribute positively to the research productivity of both clinical and non-clinical divisions in Canadian faculties of dentistry.

*Dr. ElBadrawy is a professor, and the chairman of the division of pediatric dentistry, with the faculty of dentistry at the University of Alberta, Edmonton, Alberta T6G 2N8.*

*Reprint requests to Dr. ElBadrawy.*

*This paper was presented at the 15th biannual conference of The Canadian Faculties of Dentistry, held June 11-16, 1989, in London, Ontario.*



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# Weigh the evidence<sup>1-15</sup>

| ACETAMINOPHEN                                                                                                   |                               | ASA                                                                                                                                                                                                                                                      | OTC IBUPROFEN<br>(200mg)                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| AT LABEL DOSAGE                                                                                                 |                               |                                                                                                                                                                                                                                                          |                                                                                                                                       |
| EFFICACY                                                                                                        |                               |                                                                                                                                                                                                                                                          |                                                                                                                                       |
| equipotent with ASA                                                                                             | <b>ANALGESIC</b>              | equipotent with acetaminophen                                                                                                                                                                                                                            | approximately equipotent (200mg standard dosage unit) vs 650mg acetaminophen or ASA                                                   |
| equipotent with ASA                                                                                             | <b>ANTIPYRETIC</b>            | equipotent with acetaminophen                                                                                                                                                                                                                            | approximately equipotent (200mg standard dosage unit) vs 650mg acetaminophen or ASA                                                   |
| not indicated                                                                                                   | <b>ANTI-INFLAMMATORY</b>      | required dosage generally exceeds analgesic/antipyretic levels and sustained administration is necessary to achieve serum levels required for anti-inflammatory effect                                                                                   | required dosage generally exceeds analgesic/antipyretic levels and sustained administration is necessary for anti-inflammatory effect |
| SAFETY                                                                                                          |                               |                                                                                                                                                                                                                                                          |                                                                                                                                       |
| rare hypersensitivity, GI irritation rarely occurs                                                              | <b>ADVERSE EFFECTS</b>        | GI bleeding or ulceration, nausea, vomiting, diarrhea, vertigo, tinnitus, hearing loss, pruritus, urticaria, angio-edema, anaphylaxis                                                                                                                    | epigastric pain, heartburn, nausea, dizziness, GI bleeding and hypersensitivity reactions                                             |
| slight increase in prothrombin time for patients on oral anti-coagulants but generally clinically insignificant | <b>PRECAUTIONS</b>            | history of GI ulcerations, bleeding tendencies, anemia or hypoprothrombinemia; patients with asthma or other allergic conditions; concomitant use with anti-coagulants, uricosurics, other non-narcotic analgesics, hypoglycemics, alcohol, methotrexate | cardiovascular disease involving fluid retention, bleeding disorders, kidney or liver disease                                         |
| hypersensitivity to acetaminophen                                                                               | <b>CONTRAINDICATIONS</b>      | salicylate sensitivity, active peptic ulcer                                                                                                                                                                                                              | peptic ulcer disease, sensitivity to ibuprofen, ASA or other NSAIDs                                                                   |
| no known risk                                                                                                   | <b>IN PREGNANCY</b>           | salicylates interfere with maternal and infant blood clotting and may lengthen duration of pregnancy and parturition; administration during last trimester should be avoided                                                                             | safety not established in pregnancy and nursing mothers                                                                               |
| no age restriction                                                                                              | <b>IN CHILDREN</b>            | specific risk of intoxication using therapeutic dosage in febrile and dehydrated children; association with Reye's Syndrome                                                                                                                              | not to be used in children under 12 years                                                                                             |
| hepatotoxicity may occur with overdose                                                                          | <b>HEPATIC TOXICITY</b>       | reversible hepatotoxicity in apparent risk groups at high dosage                                                                                                                                                                                         | elevated liver enzymes, jaundice, hepatitis (rare)                                                                                    |
| no direct association                                                                                           | <b>ANALGESIC NEPHROPATHY</b>  | no direct association                                                                                                                                                                                                                                    | no direct association                                                                                                                 |
| no known association                                                                                            | <b>RENAL TOXICITY</b>         | no known association                                                                                                                                                                                                                                     | reversible renal impairment in predisposed patients                                                                                   |
| oral anticoagulants (as above) chloramphenicol (increased half life)                                            | <b>DRUG-DRUG INTERACTIONS</b> | oral anticoagulants, uricosurics, non-steroidal anti-inflammatory agents, oral hypoglycemics, corticosteroids, ethyl alcohol, methotrexate                                                                                                               | ASA or other NSAIDs, coumarin type anticoagulants, diuretics                                                                          |
| ACUTE OVERDOSE                                                                                                  |                               |                                                                                                                                                                                                                                                          |                                                                                                                                       |
| potentially serious                                                                                             | <b>CLINICAL RISK</b>          | potentially serious                                                                                                                                                                                                                                      | potentially serious                                                                                                                   |
| supportive management and/or specific antidote (N-acetylcysteine)                                               | <b>TREATMENT</b>              | supportive management—no specific antidote                                                                                                                                                                                                               | supportive management—no specific antidote                                                                                            |

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## Benzodiazepine reversal with flumazenil – A review of the literature

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### ABSTRACT

Benzodiazepines such as Valium<sup>®</sup> (diazepam) or Versed<sup>®</sup> (midazolam), as used in dental procedures for intravenous sedation, have been a boon to the profession. Yet in the event of sedation problems, no agent exists that consistently reverses all clinical effects of these drugs. This problem does not exist with narcotics, frequently employed in tandem with benzodiazepines, since an effective reversal agent, Narcan<sup>®</sup> (naloxone hydrochloride), exists.

It would be advantageous to effectively reverse benzodiazepines in cases of acute emergency with respiratory depression or paradoxical reactions, and to allow quick, full recovery after short dental procedures.

None of the drugs currently available for benzodiazepine reversal, such as physostigmine, give consistent clinical results. The purpose of this paper is to discuss Flumazenil<sup>®</sup>, a new specific benzodiazepine receptor antagonist, and its possible use for dental sedation procedures.

### SOMMAIRE

Les benzodiazépines comme Valium<sup>®</sup> (diazépam) et Versed<sup>®</sup> (midazolam) que le dentiste utilise pour endormir ses patients durant les traitements, sont très utiles en dentisterie. Pourtant, quand se produisent des problèmes de sédation, il n'existe aucun agent pour renverser les effets cliniques de ces drogues. Employés souvent en même temps que les benzodiazépines, les narcotiques ne présentent pas ce genre de problèmes, puisqu'on dispose d'un agent de renversement efficace, le Narcan<sup>®</sup> (chlorhydrate de naloxone).

Il serait bon de pouvoir renverser les effets des benzodiazépines dans les cas d'urgence grave où on note une baisse de la respiration ou des réactions paradoxales, ou encore de pouvoir réveiller rapidement les patients après des traitements courts.

Actuellement, les drogues comme la physostigmine (ésérine) dont on dis-

pose pour renverser les effets des benzodiazépines ne donnent pas des résultats cliniques constants. Dans cet article, il est question du Flumazenil<sup>®</sup>, un nouvel inhibiteur des récepteurs de la benzodiazépine, et de son usage possible pour la sédation des patients dentaires.

In the past and present practise of dentistry, three words – pain, discomfort and fear – have, unfortunately, become synonymous with the profession. Over the years, a variety of methods have been used to alleviate these real and perceived patient problems.

The first effective result was achieved in the 1840s, when Horace Wells, a dentist, and William Morton, a dentist and physician, began using nitrous oxide and ether. In the 1930s, the introduction of intravenous barbiturate sedation by Goldman and Drummond-Jackson in England and Hubbell in the United States led the way for effective treatment of the apprehensive patient in an ambulatory setting.<sup>1</sup>

The introduction of sedative techniques in the dental setting followed different routes. Oral, intramuscular and intravenous modalities have all found application. Clinically, the most effective and popular method has become intravenous sedation using benzodiazepine tranquilizing agents. This offers anxiety control and a degree of amnesia during the procedures.

Benzodiazepines (BZD) are naturally occurring compounds that exist in plants such as potatoes and wheat. First synthesized by Sternbach in the F. Hoffmann-La Roche laboratories some 30 years ago, they were found to have sedative, hypnotic and anticonvulsant effects.<sup>2-4</sup> Hasley<sup>2</sup> proposed that BZDs act by increasing the effectiveness of gamma-aminobutyric acid (GABA), the major central nervous system (CNS) inhibitory neurotransmitter. Along with the BZD receptor, an integral part of the GABA receptor complex,<sup>5-7</sup> different BZD effects were found to be related to

the degree of BZD receptor occupancy of GABA.<sup>4</sup>

BZDs such as diazepam or midazolam, often utilized in tandem with narcotics in dental intravenous sedation, are mainly used for their anxiolytic, sedative and amnesic properties.<sup>1</sup> Adverse side effects of BZDs, such as paradoxical crying or hysteria, prolonged recovery time, or accidental overdose with respiratory depression have been noted.<sup>8-10</sup> Although effective narcotic reversal agents such as Naloxone<sup>®</sup> exist, effective reversal agents for BZD reversal are lacking.<sup>3,10</sup> Numerous agents such as methylxanthines (caffeine, aminophylline), anticholinesterases (physostigmine), opioid antagonists (naloxone) and analeptics (doxapram) have been used in the past for BZD reversal.<sup>11</sup>

The most common reversal agent, physostigmine (Antilirium<sup>®</sup>), is a centrally active, tertiary amine anticholinesterase. It readily crosses the blood brain barrier and exerts an effect in the CNS.<sup>3,12</sup> Its ability to antagonize sedation is thought to be due to nonspecific central arousal. However, its reversal of BZDs has been found to be unreliable, and its use is accompanied by side effects such as dysphoria, excessive salivation, nausea and vomiting, bradycardia, hypotension, urination and defecation.<sup>11</sup> When physostigmine is used, the patient should also be ECG monitored for the duration of effect (35 to 45 minutes) due to potential arrhythmias.<sup>3</sup> In addition, Garber et al<sup>3</sup> found no improvement in awareness or psychomotor function with physostigmine use in patients sedated with intravenous diazepam. Spaulding et al<sup>3</sup> reported that physostigmine may reverse the sedative effects of BZDs while paradoxically worsening respiratory depression.

### Flumazenil<sup>®</sup> – A New Reversal Agent

Benzodiazepines act by increasing



the effectiveness of the CNS neurotransmitter gamma - aminobutyric acid (GABA). Flumazenil<sup>®</sup> (Hoffman - La Roche Ltd.) is an imidazobenzodiazepine antagonist that binds to the same GABA receptor sites as BZDs in a specific and reversible fashion<sup>3</sup> (Fig. 1). First synthesized in 1979, its effects were discovered after a related substance was injected into a rat heavily sedated with BZDs. The rat immediately woke up and ran away.<sup>6</sup>

Flumazenil cannot antagonize the nonspecific effects of lethal doses of BZDs. The drug is specific to the BZD effects produced at the GABA receptor sites.<sup>2-5,9</sup> As a BZD competitive receptor antagonist, it can block or reverse behavioral and neurological effects of all BZD agonists, such as sedative, respiratory depressant, anxiolytic, muscle relaxant, anticonvulsant and amnestic effects<sup>5,13</sup> (Fig. 2). It was first introduced into clinical practice in Europe in 1987.

## Actions

Flumazenil is a weak base, soluble enough in water to form an injectable solution of 0.1 mg/mL at a pH of about four.<sup>6</sup>

Elimination is through hepatic metabolism and excretion is via the urine mainly as a free carboxylic acid (Fig. 3). Only small amounts appear in the urine as the unchanged drug.<sup>14</sup> The bioavailability of Flumazenil following oral administration is low due to high first pass effects through the liver.

Flumazenil has been shown not to reverse the effects of opioids, barbiturates, and ketamine. It does antagonize the sedative, respiratory depressive, anxiolytic, muscle relaxant, anticonvulsant, amnestic and anesthetic effects of BZDs.<sup>3,12</sup> However, the animal studies conducted to date have not indicated the efficacy of its use in long-term chronic BZD abuse.<sup>15</sup> In a combined case of BZD/tricyclic antidepressant overdose, it was reported that Flumazenil reversal caused convulsions and cardiac arrhythmia due to the unmasking effects of the tricyclic antidepressants.<sup>16</sup> Caution was also indicated with Flumazenil use in benzodiazepine controlled epilepsy.<sup>17</sup> Anxiety has been reported with Flumazenil administration. This may be due to quick reversal in an unfamiliar environment.<sup>18</sup> Other reported side effects have been nausea (4.6 per cent), vomiting (2.8 per cent), discomfort (two per cent), crying (1.4 per cent), mild increase in heart rate (1.4 per cent), tremor (1.2 per cent), involuntary

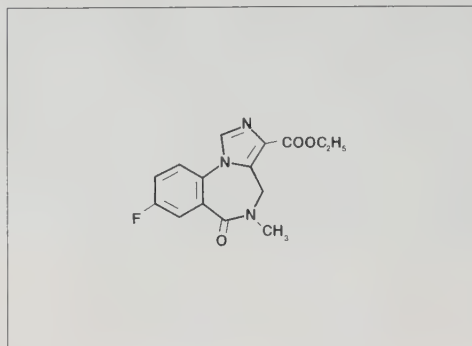


Fig. 1: Flumazenil molecule.

movements (1.2 per cent), and dizziness (one per cent).<sup>3</sup> Limited data suggest that Flumazenil may be effective in the reversal of acute ethanol intoxication.<sup>19</sup> A case of Flumazenil reversed carbamazepine (Tegretol<sup>®</sup>) intoxication also raised questions of whether mechanisms other than BZD receptor antagonism were responsible for the action of Flumazenil.<sup>20</sup>

## Clinical Effects

Flumazenil as an antagonist will reverse BZD effects depending on the amount of BZD receptor occupancy.<sup>4</sup> In low doses, hypnosis and sedation are first antagonized, with anticonvulsant and anxiolytic properties being antagonized only at higher doses.<sup>5</sup> Administration of Flumazenil at doses of 0.1 to 10 mg by intravenous titration usually produced results within 60 seconds. The duration of effect was from 30 minutes to two hours, with a half-life of 0.83 to 1.5 hours.<sup>3</sup> Problems could conceivably result with a relapse of reversal in the case of longer acting BZDs. The half-life of diazepam is from 20 to 50 hours.<sup>1</sup>

Adverse cardiovascular effects have not been noted with Flumazenil mediated BZD reversal. There is no cardiovascular rebound or hypertension, as is sometimes seen with naloxone reversal of opioids. However, Schneider et al<sup>21</sup> noted potential problems using Flumazenil with cardiac patients undergoing catheterization under midazolam sedation due to potential ischemia in patients with coronary heart disease.<sup>6,18</sup>

At hypnotic doses, BZDs affect respiration by decreasing tidal ventilation, the ventilatory response to CO<sub>2</sub>, and hypoxemia.<sup>21</sup> In published studies, Flumazenil has been found to reverse respiratory depression induced by diazepam, flunitrazepam and midazolam. It had no effect on morphine induced respiratory depression.<sup>6,17,21</sup> Weinbrum and Geller<sup>22</sup> showed that with a combi-

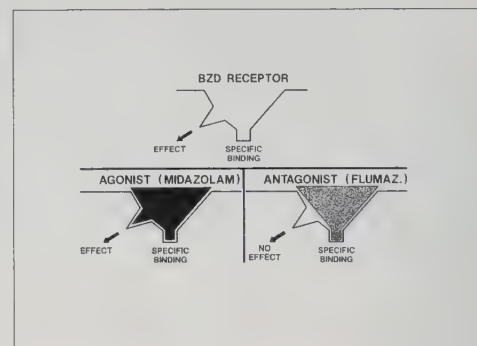


Fig. 2 : A BZD receptor site on a GABA receptor complex demonstrating antagonist activity against BZD agonist.

(Reproduced with permission, Dr. R. Amrein)

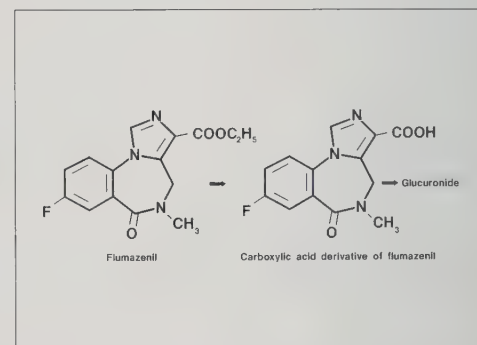


Fig. 3: The only known metabolite of flumazenil, the inactive carboxylic acid which is glucuronized and excreted via the urine.

(Reproduced with permission, Dr. R. Amrein)

nation of opiates and BZDs, Flumazenil did not lower SaO<sub>2</sub> (arterial O<sub>2</sub> saturation) levels when sedation was antagonized. Carter et al<sup>23</sup> showed that Flumazenil reversal of midazolam-induced respiratory depression was slow in an emergency situation. They restated the need for preoxygenation and oximetry monitoring of patients. Lim<sup>24</sup> also stated that Flumazenil only partially and variably reversed diazepam induced respiratory depression.

The use of Flumazenil as a BZD reversal agent in cases of intracranial pathology has also been examined. It was found that midazolam could decrease cerebral blood flow (CBF) by 40 per cent in conjunction with a decrease in intracranial pressure (ICP).<sup>4</sup> Lauven and Kulka<sup>8</sup> found that the administration of Flumazenil alone had no effect on the cerebral blood flow of healthy volunteers. In normal patients sedated with BZDs, Flumazenil reversal restored cerebral blood flow to normal without an "overshoot."<sup>9</sup> However, Wolff<sup>25</sup> noted, in animal models, that midazolam reversal with Flumazenil in the presence of cerebral ischemia did demonstrate an overshoot in CBF. Fleischer et al<sup>4</sup> noted increased ICP and CBF in



dogs, lasting as long as 15 minutes.

## Implications of Flumazenil use in Dentistry

The primary clinical uses of Flumazenil in dentistry appear to be for emergency reversal of accidental BZD overdose and for reversal of sedation after short dental procedures.

There are not many reports of Flumazenil use in dentistry. The drug was introduced into Europe in 1987<sup>6</sup> with anticipated release into the United States and Canada as of January 1992 under the trade names Mazicon<sup>TM</sup> and Anexate,<sup>R</sup> respectively.<sup>26</sup> Questions addressed in the literature have pertained to the use of the drug, its cost, effectiveness and indications, as well as concerns respecting resedation.

Rosenbaum and Hooper<sup>10</sup> studied patients undergoing dental procedures under midazolam sedation. They found a clear reversal of sedation with no amnesic effect in regards to the actual dental procedure. Ochs et al<sup>11</sup> studied dental patients undergoing third molar extraction with intravenous midazolam. They found Flumazenil terminated the amnesic properties of midazolam, but to a lesser extent than its reversal of sedation. It was concluded that Flumazenil could be of benefit for the early, yet safe, discharge of patients. Young et al,<sup>13</sup> in a University of Toronto study, sedated young, healthy dental patients with diazepam. Reversed with Flumazenil, they demonstrated a more rapid awakening and return of psychomotor functions than control subjects. Short and Galletly<sup>27</sup> found that Flumazenil reversal of midazolam resulted in better immediate psychomotor performance. However, the possibility of resedation was noted when using low doses of Flumazenil.

The problem of resedation due to the short half-life of Flumazenil is often mentioned in the literature.<sup>21,28-31</sup> Whitwam<sup>32</sup> and Hooper stated that the issue of resedation in the conscious sedation of outpatients was over emphasized.

They stated that the concept of retaining a patient for several hours after the use of a reversal agent was fallacious unless it was the normal practise after any ambulatory surgery. However, normal precautions (i.e. escorts, no driving, etc.) should be employed. In another paper, Whitwam<sup>18</sup> stated: "Criticisms of the use of Flumazenil to reverse its effects (midazolam) are really a statement of the inability of the medical profession as a whole to under-

stand the danger of excessive sedation." The use of Flumazenil should not be a panacea for a clinician's inadequate sedation technique.

The use of Flumazenil as an emergency reversal drug for acute BZD intoxication has also been recorded in the medical literature on numerous occasions.<sup>16,29,30,33,34</sup> Rosenbaum and Hooper<sup>10</sup> and Whitwam and Hooper<sup>32</sup> recommend its inclusion in emergency drug kits where conscious sedation techniques are part of a dental practice.

In summary, it is conceivable that Flumazenil will find a place in the operating room as an emergency reversal drug, and in certain procedures such as neurosurgery where contact with a lucid patient may be needed at times during an operation. In dentistry, Flumazenil may find use for the emergency reversal of intravenous sedation in dental and oral surgical procedures. The efficacy of its routine use is subject to debate, and more clinical studies may be needed before it is accepted as a routine treatment mode. Currently accepted treatment protocols may leave a practitioner at a legal disadvantage with the reemergence of sedation in an unattended patient.

The eventual cost of the drug and individual practice philosophies will also play a part in its acceptance. The use of Flumazenil as an emergency reversal drug has been recommended, however, and it may well become the accepted benzodiazepine reversal agent of choice in future dental practice.

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*The views of the authors do not purport to reflect the positions of the United States Department of the Army or the Department of Defense (Para. 4-3, AR 360-5).*

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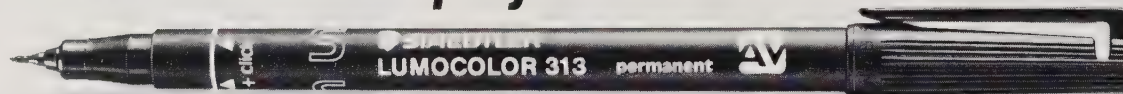
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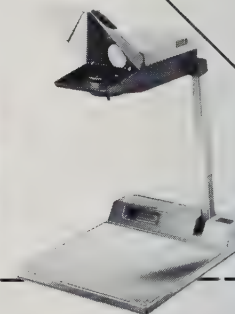
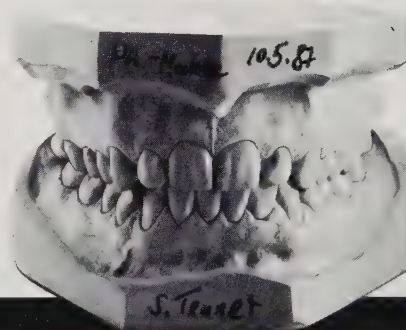
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## Inflammatory hyperplasias of the oral mucosa

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### ABSTRACT

Reactive inflammatory hyperplastic lesions of the oral mucous membranes comprise one of the most common pathological conditions seen in the oral cavity. Over the years, these "lumps and bumps" have been given a wide variety of names and have engendered a spectrum of theories regarding pathogenesis. This article presents a brief overview of these conditions from the perspective of those lesions that are "common" and those that are "not so common." Clinical examples are featured and, while their pathogenesis receives some comment, no attempt has been made to present either an in-depth discussion or a detailed histomorphological description of the various entities. The accompanying bibliography provides sufficient reference material for those wishing more detail regarding reactive hyperplasias of the oral mucosa.

### SOMMAIRE

Les lésions hyperplasiques inflammatoires réactives des muqueuses buccales comprennent l'une des affections pathologiques les plus communes observées dans la bouche. Avec le temps, ces boules et ces bosses ont reçu toutes sortes de noms et donné lieu à toutes sortes de théories touchant leur pathogenèse. Dans cet article, on trouvera un bref compte rendu sur ces affections qu'on a abordées en faisant la distinction entre les lésions communes et celles qui le sont moins. On trouvera aussi des exemples de cas cliniques; bien que leur pathogenèse fait l'objet de quelques commentaires, elle ne donne pas lieu à une discussion approfondie ni à une description histomorphologique détaillée des différentes entités. En effet, la bibliographie contient assez d'ouvrages de référence pour ceux qui voudraient plus de détails sur les hyperplasies réactives des muqueuses buccales.

### General Principles

#### Definition

By strict definition, both hyperplasia and inflammation are considered to represent distinct tissue reactions. Hyperplasia is classically defined as "an increase in size of an organ or tissue due to an increase in the number of its constituent cells."<sup>1</sup> Inflammation represents "the local reaction of tissue to injury."<sup>2</sup> If one combines the two definitions, inflammatory hyperplasia can be described simply as "an increase in the size of an organ or tissue due to an increase in the number of its constituent cells, as a local response of tissue to injury."



Fig. 1: Firm, sessile fibroepithelial polyp in buccal mucosa of 47-year-old male. Present for at least five years.

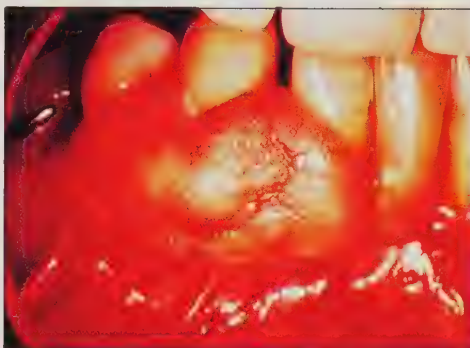


Fig. 2: Large, fibrous epulis arising from labial marginal gingiva associated with ill-fitting partial denture. Note the heavily stippled surface, indicative of marked fibrosis of the underlying lamina propria.

### Clinical Features

Despite a historical complexity of nomenclature, almost all inflammatory hyperplasias present as exophytic masses of varying duration and exhibiting variable degrees of inflammation with corresponding clinical signs and symptoms. In many instances the clinical features of individual lesions reflect a combination of the nature and duration of the insult, the anatomic peculiarities of the location, and in specific cases, systemic factors which alter local tissue reactions.

Occasionally, inflammatory hyperplasias present with alarming clinical features such as pain, bleeding and the impression of recent and rapid growth.

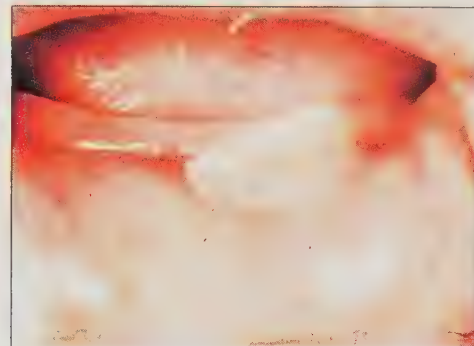


Fig. 3: A denture epulis exhibiting the typical flattened and fissured polypoid appearance of a lesion developing in association with the labial flange of an ill-fitting lower denture.

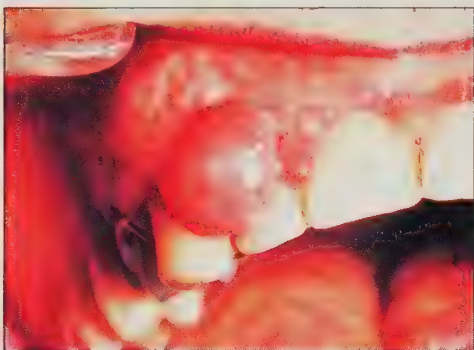


Fig. 4A: Inflammatory papillary hyperplasia of the palate in a 55-year-old female who wore her upper denture at all times. Denture hygiene was reasonable but the prosthesis had not been relined in years.





**Fig. 4B:** Low power photomicrograph of a section of palatal mucosa affected by inflammatory papillary hyperplasia. Note keratin debris in the depths of the crypts between individual papillae (arrows), and an inflammatory infiltrate in the upper edematous lamina propria (arrowheads).



**Fig. 5:** Excellent example of a pyogenic granuloma arising in the labial interproximal area of 1.3 and 1.2. Note the satellite lesion between 1.2 and 1.1.

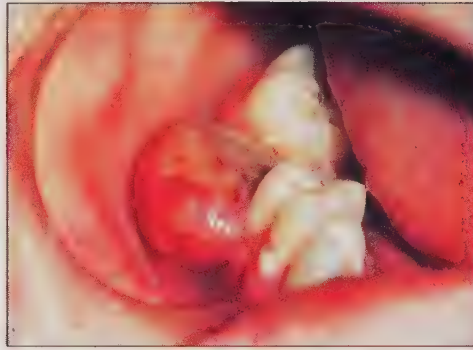


**Fig 6:** Pyogenic granuloma growing from the mid-dorsal surface of the tongue in a 33-year-old pregnant individual. Lesion had been present for six weeks.

In these cases, the patient may not be able to recall the initial tissue injury — a local factor cannot be identified and the clinical presentation becomes one of an unexplained tissue mass that is suddenly increasing in size. Equally worrisome and frustrating is the fact that despite identifying and removing the potential "irritant," the hyperplastic mass fails to resolve. Such a lesion must undergo histological investigation to



**Fig. 7:** A parulis arising from a chronic dento-alveolar abscess caused by the non-vital 4.7. In this example pus (arrow-head) can be seen emanating from the stoma, which has formed at the surface of a small mass of granulation tissue.



**Fig. 8A.** This large, firm peripheral giant cell granuloma arose in a 16-year-old female in the extraction site of 4.6. It had reached this size in about four months. Note the erythematous color of the mass and the necrotic superior surface created by occlusal trauma.



**Fig. 8B:** Radiograph of the lesion in Figure 8A. Note the bone loss in the extraction site and superficial resorption at the alveolar crest (arrowhead).

rule out a true neoplastic process.

## Pathobiology

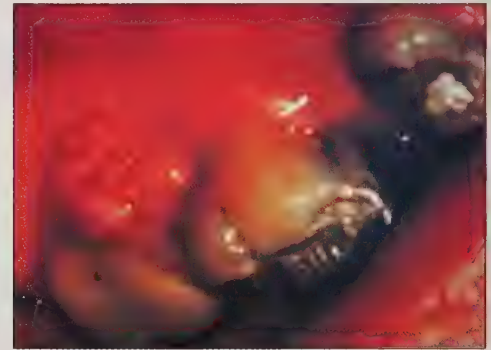
In order to understand the pathogenesis of inflammatory hyperplasias, it is necessary to consider the unique characteristics of the tissues involved. Oral mucosa is a thin, relatively friable tissue which has a rich vascular supply and is covered by epithelium exhibiting



**Fig. 9:** Florid example of dilantin gingival hyperplasia. The multiple, nodular overgrowths of individual interdental papillae is clearly evident. Note the abundant plaque, the anterior overbite and the obvious problems this person would have attempting to affect good oral hygiene.



**Fig. 10:** Cyclosporin A-induced gingival hyperplasia. This occurred in a 19-year-old female who had been taking 800 mg of Cyclosporin A for an allogenic renal transplant. The enlargements became evident six months after commencing therapy.



**Fig. 11:** Peripheral Ossifying Fibroma arising in the palatal interproximal region of 1.6-1.7. Note the cerebriform surface and the impression that the mass has arisen from "deeper" structures to present as a sessile exophytic mass.

variable degrees of keratinization. Additionally, that portion of oral epithelium covering the dorsal surface of the tongue possesses a highly organized and unique papillated structure. Oral mucosa exhibits an epithelial cell turnover of between eight to nine days, compared to a turnover time of approximately 18 days for skin epidermis and a 48-hour cycle for intestinal mucosa.<sup>3</sup> Associated with the surface of this bio-



logically and metabolically active tissue is an extremely complex microbial flora that readily infects any area of epithelial degeneration.

This highly reactive mucosa manifests a rapid and florid inflammatory reaction as its initial response to injury, thus setting the stage for repair and resolution. However, because of the proximity of the inflamed mucosa to teeth, various dental appliances, ill-fitting dentures, etc., the resultant inflammatory edema and swelling lead to repeated irritation; as, for example, the continued wearing of a poorly-fitted denture, the presence of a rough and over-contoured restoration or a bonded orthodontic bracket. The persistent irritation modulates the normal inflammatory and repair processes, and the net result is the formation of an excessive amount of granulation tissue.

Thus a cycle of tissue reactivity is established that eventuates in the formation of a stable, bulky and relatively avascular mass of connective tissue (Fig.1). Because the lesion is essentially dense scar tissue, it persists, despite the fact that the irritant has been eliminated and the inflammation has resolved. This mass is usually surfaced by epithelium exhibiting varying degrees of atrophy and/or hyperplasia.

The element of chronicity is significant in these lesions and, in time, the patient becomes accustomed to the presence of the "lump." A renewal of trauma or irritation will rekindle the

inflammatory response and the mass will seem to undergo a sudden increase in size. The clinical presentation in this instance will be that of a long standing bump or lump that starts to grow. In these circumstances patients are concerned that they have developed a tumor and the possibility of neoplasia must be excluded by histopathological examination.

Although the basic underlying mechanisms are the same for all inflammatory hyperplasias, local anatomy, the nature of the irritants, individual tissue reactivity and occasional systemic effects and factors, yet to be understood, act in concert to produce a number of clinically distinct and well recognized lesions. The remainder of this discussion will be devoted to a classification and brief discussion of examples of "common" and "not so common" inflammatory hyperplastic lesions of the oral mucosa.

## Common Inflammation Hyperplasias

### Introduction

Inflammatory hyperplasias are best considered within a clinical context. The numerous terms, descriptions, proposed etiologies and speculative pathogenesis of many of the inflammatory hyperplastic lesions affecting the oral mucosa reflect the background, training and experience of investigators who have documented these lesions over the

years. Textbooks present simplified, rather dogmatic viewpoints, while case reports, clinical studies and review articles afford their authors the advantages of in-depth and reflective opinions. The following discussion of inflammatory hyperplasias represents a brief compilation of texts and review articles dealing with some of the aspects of these common reactive lesions (Table I).

## Clinical Presentations

### Fibroepithelial Polyp/ Fibrous Epulis

These two entities will be discussed together because the underlying biological mechanisms responsible for their development are identical. Both conditions are the result of a reparative process initiated by an inflammatory response to a wide variety of injuries, including direct trauma, ill-fitting dental appliances, calculus, etc. The term fibroepithelial polyp was introduced into the dental literature almost 40 years ago.<sup>4</sup> By the early 1960s some dental texts referred to the lesion as simply a fibrous epulis arising in oral mucosa other than the gingival tissues; an epulis being defined as "a bump on the gum."

The clinical features of these two lesions reflect their various stages of development and maturation from a swollen, erythematous, soft and inflamed lump, to a firm, pale and relatively avascular mass of scar tissue. Despite this simple concept of a reactive inflammatory hyperplasia involving either gingivae or oral mucosa and presenting as a lump of collagen in varying stages of maturation, current oral pathology texts are confusing. One book refers to the fibroepithelial polyp as a connective tissue tumor and, while stating that it is the most common benign soft tissue neoplasm in the oral cavity, an additional reference is made to the fact that oral fibromas and reactive fibrous hyperplasias are histologically identical and intimately related.<sup>6</sup> Other texts refer to these lesions as fibromas but point out that they are not true neoplasms,<sup>7</sup> while another book<sup>8</sup> describes these lesions as traumatic fibromas.

These reactive lesions are common and arise from areas of oral mucosa frequently being traumatized, such as buccal mucosa, tongue, lip and gingivae. Their most common clinical presentation is that of a soft or firm, sessile, polypoid mass. Unless recently trauma-

TABLE I

### Common Inflammatory Hyperplasias

| Clinical Lesion                     | Clinical Terminology                                                                                  |
|-------------------------------------|-------------------------------------------------------------------------------------------------------|
| Fibroepithelial Polyp               | reactive fibroma<br>traumatic fibroma<br>fibroma<br>irritation fibroma                                |
| Fibrous Epulis                      | gingival fibroma<br>peripheral fibroma<br>focal gingival hyperplasia                                  |
| Denture Epulis                      | epulis fissuratum<br>denture hyperplasia                                                              |
| Papillary Hyperplasia of the Palate | papilliferous hyperplasia<br>palatal papillomatosis<br>inflammatory papillary hyperplasia             |
| Pyogenic Granuloma                  | pregnancy tumor<br>pubertal gingival hyperplasia<br>pregnancy granuloma<br>fibroendothelial papilloma |



tized they are asymptomatic and, depending on the location and the degree and nature of the injury, surface epithelium can be either slightly leukoplakic or ulcerated. Often the color of the polyp is similar to that of the surrounding mucosa, but it will be paler if the component tissues are avascular or, conversely, erythematous as a consequence of intercurrent inflammation in response to recent irritation. **Fig. 1** is an excellent example of a fibroepithelial polyp that had developed in the buccal mucosa. Treatment of these lesions consists of excisional biopsy.

The fibrous epulis has been described as the equivalent of a fibroepithelial polyp occurring on the gums. While it would seem a simple matter to describe the epulides as related to their location and clinical features, there have been attempts to classify four distinct histologic types: fibrous, fibroblastic, vascular and densely collagenous.<sup>9</sup> As described below, vascular and fibroblastic epulides likely belong in separate clinical categories. Current oral pathology and oral diagnosis texts refer to the fibrous epulis variously as a fibroma of the gums,<sup>6</sup> a fibrosed pyogenic granuloma,<sup>7</sup> or ignore the lesion altogether.<sup>8</sup>

The clinical features of a large fibrous epulis are illustrated in **Fig. 2**. The shape, color, surface texture and degree of fibrosis are the result of the reparative process and the anatomy of the area. Often these lesions develop in an interproximal location and are frequently pedunculated. In the past, there has been a suggested female predilection of two to four times that of males. However, this apparent sexual dimorphism tends to disappear if epulides are grouped according to specific subtypes. Surgical excision is the recommended treatment for fibrous epulis.

One of the more frequent complaints involving fibroepithelial polyps and fibrous epulides is a history of a long-standing lump that suddenly increases in size or starts to "grow." The most likely cause is recent trauma with subsequent inflammatory edema. However, one must always consider the possibility that the lump may be a neoplasm such as a lipoma, neurofibroma or minor salivary gland tumor. Surgical excision and histologic evaluation must be undertaken to rule out neoplasia and to put the patient's mind at ease.

## Denture Epulis

This group of inflammatory hyperplasias owes its incorporation into a

**TABLE II:**

## Not-so-common Hyperplastic Lesions

| Clinical Lesions                 | Clinical Terminology                                                                                                                                        |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parulis                          | draining sinus<br>fistula<br>gum boil                                                                                                                       |
| Peripheral Giant Cell Lesion     | peripheral giant cell granuloma<br>peripheral giant cell reparative granuloma<br>reparative peripheral osteoclastoma<br>giant cell epulis<br>myeloid epulis |
| Giant Cell Fibroma               | (may not exist as specific lesion)                                                                                                                          |
| Dilantin Gingival Hyperplasia    | dilantin stomatitis<br>dilantin hyperplasia                                                                                                                 |
| Cyclosporin Gingival Hyperplasia | phenytoin hyperplasia                                                                                                                                       |
| Peripheral Ossifying Fibroma     | peripheral fibroma with calcification<br>peripheral odontogenic fibroma<br>calcifying fibroid epulis<br>peripheral cementifying fibroma                     |

separate category not because of any unique biological properties but because of a constant association with tissue irritation and trauma caused by ill-fitting dental prostheses. In some populations the probability of identifying oral mucosal lesions, described as either ulcerated or proliferative, has been found to be approximately 50 per cent for those individuals wearing defective dentures.<sup>10</sup>

Comprehensive descriptions of denture-related inflammatory hyperplasias are presented in a number of oral pathology texts and have been described as ulcers that re-epithelialize, while the inflammatory reaction subsides, and an ensuing fibroblastic reaction produces a raised mass of tissue.<sup>5</sup> While epulis fissuratum is a common clinical term, a recent publication considers the terms denture hyperplasia and epulis fissuratum as outdated and suggests these lesions be referred to as denture induced fibrous hyperplasias.<sup>8</sup>

Rarely, a true neoplasm of oral mucosa will grow up and around the flange of a denture producing a clinical picture similar to denture hyperplasia.<sup>7</sup> Therefore, it is accepted clinical practice to send all denture hyperplasias removed prior to the construction of new dentures for histologic evaluation. **Fig. 3** is an example of a denture epulis of the oral mucosa.

## Papillary Hyperplasia of the Palate

The etiology and pathogenesis of the relatively common denture epulis are well recognized and established, but the same cannot be said for papillary hyperplasia of the palate. While the vast majority, if not all cases of this condition, are related to or associated with ill-fitting dentures, the exact nature of the irritant is yet to be identified.<sup>11,12</sup>

This condition, which has been recorded in one in 10 individuals who wear upper dentures, presents as multiple papillary or polypoid projections of palatal mucosa, between two millimetres and four mm in diameter and projecting between three mm to five mm above the surface.<sup>8</sup> The lesions are inflamed and erythematous but seldom symptomatic, although occasionally focal ulceration can cause discomfort.

The almost exclusive location of the papillomas beneath the palatal surface of an ill-fitting denture, especially marked in association with relief chambers, and the fact that seldom does the condition extend onto the crest of the ridge, suggests a significant relationship of this condition to the unstable palatal denture base. Studies have shown an association between papillary hyperplasia of the palate and candidiasis, although it is not clear whether this is a primary or secondary event.<sup>8</sup> There



has been a suggestion that this condition is caused by the presence of candida in a background of mild chronic mechanical irritation from the constantly worn and poorly-fitting denture.

Despite its sometimes alarming clinical presentation of a markedly erythematous and nodular surface, papillary hyperplasia of the palate is not a premalignant condition. The most acceptable form of management is the construction of a new denture on a sound and healthy mucosal surface. In general, treatment is aimed at eliminating the inflammatory component by removing the denture or instituting some form of tissue conditioning with the addition of an antifungal preparation. Once this has been accomplished, the multiple papillary lesions can be removed by a variety of surgical techniques, including curettage, electro-surgery and laser ablation. **Fig. 4** shows a clinical example and representative histology of papillary hyperplasia of the palate.

### Pyogenic Granuloma

The pyogenic granuloma possesses sufficiently distinct clinical and histologic features to justify its categorization as a clinically separate inflammatory hyperplastic lesion. When it was first described in the late 1800s, the lesion was given the name *botryomyco-sis hominis*.<sup>13</sup> Its current designation, pyogenic granuloma, first appeared in dermatology publications around the turn of the century,<sup>10</sup> but it was almost 50 years later that the entity was introduced into the dental literature.<sup>9</sup>

Despite its well recognized status in dental medicine, standard oral pathology and oral medicine texts are confusing in their presentation of pyogenic granuloma. Thus mucosal lesions have been described as inflammatory hemangiomas, and gingival lesions as localized gingival hemangiomatous hyperplasias,<sup>5</sup> presenting as pedunculated growths involving one or several interdental papillae. While there is almost universal acceptance that pyogenic granuloma is not caused by pyogenic organisms, one text places these lesions in its section dealing with bacterial, viral and mycotic infections.<sup>6</sup> In other books, pyogenic granuloma is presented as a special variety of inflammatory hyperplasia in which surface ulceration is an integral part of the process,<sup>7</sup> and in another publication the lesions are stated as belonging to, or a manifestation of, a reactive vascular lesion.<sup>8</sup>

What can be stated with some degree

of certainty is that pyogenic granulomas represent an exuberant and reactive proliferation of granulation tissue in which the vascular component is dominant. Why this type of reaction ensues, and to what extent systemic factors such as hormonal imbalances during pregnancy and puberty affect the tissue response, are unknown at this time.

Pyogenic granulomas present clinically as elevated, sessile or pedunculated soft tissue masses. Their color varies from pink to a deep purple-red and is influenced by the amount of secondary inflammation, ulceration and degree of vascularity. The consistency of the mass can be soft or spongy but will become rubbery or firm if the causative agent is removed. In 60 to 70 per cent of cases, the lesions arise from the gingival tissues, with a majority involving the anterior maxillary sextant. This site predilection may reflect the unique anatomy of this region, together with the large number of irritants affecting this tissue and the rich microbial flora of the gingivae. Individuals in the second, third and fifth decades are affected most frequently and some studies suggest a female predilection.<sup>9,13-15</sup>

The growth of pyogenic granulomas can be alarmingly rapid, although there is some suggestion that the lesions tend to reach a certain size after which growth slows or becomes static. The duration of the lesions ranges from seven days to seven years, with those involving the gingival tissues tending to have a shorter history. Recurrence rates vary between eight per cent and 16 per cent, and recurrence is stated to be more frequent during pregnancy. Some clinicians feel that if a pyogenic granuloma is allowed to pursue its natural course, after removal of the irritant, the lesion will regress and become indistinguishable from a fibrous epulis.<sup>9</sup> This opinion is not shared by all investigators.<sup>13</sup>

While pyogenic granuloma possesses rather classical clinical features, one must always consider that a rapidly-growing soft tissue mass may represent a true neoplasm, possibly malignant. Oral Kaposi's sarcoma, a well-recognized complication of individuals suffering from AIDS, can, in its early stages, resemble pyogenic granuloma. Therefore, surgical excision and histologic evaluation are recommended for the management of these reactive and hyperplastic masses of granulation tissue. **Figs. 5 and 6** represent pyogenic granulomas arising from marginal gingiva and the dorsal surface of the tongue respectively.

## Less Common Inflammatory Hyperplasias

### Introduction

Despite the ubiquitous nature of uncomplicated inflammatory hyperplasias of oral mucosa, and the time-worn axiom that "common things occur commonly" there are a number of conditions that, while presenting as lumps or bumps, are not manifestations of common reactive inflammatory hyperplasias. Several of these entities are unusual and controversial, but the constellation of their clinical features, histology and proposed etiology and pathogenesis justifies their inclusion into a loosely arranged group of "not-so-common" lesions (**Table II**). A brief description of their clinical features, treatments and prognoses is therefore warranted. An additional complication arises from the fact that these lesions can become traumatized and the resultant secondary inflammatory hyperplasia may thoroughly confuse the clinical picture.

### Clinical Presentations

#### Parulis

A parulis is defined as an "abscess of the gingiva" and, while not strictly representative of reactive hyperplasia, frequently presents as a small inflamed epulis. The lay term for this lesion is "gum boil," and it is seen most often in children, arising in association with a draining alveolar abscess related to periapical inflammation and suppuration. If the pulpal/periapical problem is not obvious, and suppuration is minimal, these lesions can be mistaken for an inflamed fibrous epulis or pyogenic granuloma. A draining periodontal abscess can also result in a parulis.

A parulis can occur anywhere on the labial, buccal or palatal alveolar mucosa. If the sinus is active and the tooth untreated, the swelling will wax and wane in tandem with suppuration, drainage and temporary resolution. Over time, a sufficient amount of granulation tissue may be produced that upon complete resolution of the infection a small mass of residual scar tissue remains, a fibrous epulis being the end result.<sup>7</sup> The most significant aspect of these lesions is the realization that they represent deeper underlying disease related to a necrotic pulp, periapical inflammation, or a periodontal abscess associated with inflammatory periodontal disease. **Fig. 7** represents a parulis that developed in association with a non-vital lower molar.



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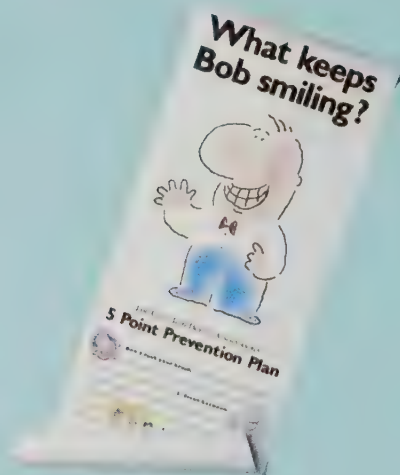
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## Peripheral Giant Cell Lesion

Peripheral giant cell lesions generally present as rapidly growing, vascular masses arising from gingival tissues or alveolar mucosa in an edentulous region. Thus, while their outward clinical features are similar to those of other vascular, reactive and hyperplastic lesions, the distinct histological feature of multinucleated giant cells sets them apart from other hyperplasias and justifies their inclusion into a separate category.

The unique histological characteristics of these lesions were recognized by early investigators, who for many years referred to the lesion as "giant cell epulis."<sup>5,16</sup> The term "giant cell reparative granuloma" was introduced in the early 1950s in an attempt to emphasize the benign, non-neoplastic nature of these masses as distinct from true giant cell tumor of bone. The adjective "peripheral" was added to separate those lesions arising in bone from the more common gingival soft tissue masses.<sup>16</sup> While there is universal agreement that these lesions are examples of reactive hyperplasias, the current practice is to discontinue the use of the term "reparative" as it seems these lesions are repairing nothing.<sup>6</sup> There is even some controversy regarding the term "granuloma," as this designation is usually reserved for a specific type of chronic inflammatory process.

Peripheral giant cell lesions arise exclusively from either gingival tissues or alveolar soft tissues in edentulous sites. The lesions are exophytic and present most often as firm, vascular, reddish-purple masses anterior to the first permanent molar.<sup>16</sup> Some clinicians state that the lesions give an impression of possessing a deep-seated origin, perhaps originating from periodontal ligament or mucoperiosteum, in contrast to lesions such as pyogenic granuloma.<sup>17</sup> This impression is supported by the number of peripheral giant cell lesions that are associated with surface bone resorption. Growth can be rapid and sometimes alarming. However, cases have been reported in which there was cessation of growth with resolution resulting in a firm mass of dense connective tissue indistinguishable from that of a fibrous epulis. More commonly, the lesions exhibit varying degrees of vascularity and inflammation, often associated with surface ulceration. The size can range from 0.5 to 1.5 cm, with a bimodal age distribution in adolescence

and the fourth to sixth decade. In this latter group, some investigators report a female-male ratio of 2-1.<sup>12</sup> Radiographs often show no bone involvement, but there can be a "cupping" defect associated with the lesions, possibly the result of a pressure effect. Occasionally, giant cell lesions arising in bone will erode through the cortex and present as a peripheral mass.<sup>18</sup> Thus, there must be a radiographic investigation of all giant cell lesions. **Fig. 8** is an excellent example of a peripheral giant cell lesion that arose in an extraction site in a 16-year-old female.

The etiology of peripheral giant cell lesion has never been firmly established, but most investigators agree that they are reactive and likely represent an inappropriate hyperplastic response of periosteal tissue to trauma, or an as yet to be identified irritant.<sup>6,15,16</sup> Despite their often rapid growth and alarming clinical presentation, the lesions are relatively self limiting and the treatment of choice is surgical excision. A recurrence rate of 10 per cent to 11 per cent demands careful follow-up,<sup>15</sup> and occasionally, after several recurrences, adjacent teeth have to be extracted to irradiate the lesion. Rarely, if ever, has hyperparathyroidism been associated with peripheral giant cell lesion.<sup>16</sup>

## Giant Cell Fibroma

Although this condition has been documented in a number of dental publications,<sup>19-21</sup> and similar lesions are recognized as distinct tumor-like conditions of skin,<sup>22</sup> some clinicians doubt its existence as a separate and distinct reactive oral mucosal lesion.<sup>8,20</sup> Giant cell fibromas first appeared in the dental literature in 1974,<sup>19</sup> and a large review was published eight years later.<sup>21</sup> A recent oral pathology text refers to the lesion as the "so-called giant cell fibroma,"<sup>18</sup> while another text acknowledges its existence but cautions clinicians not to confuse it with peripheral giant cell lesion.<sup>6</sup>

As the name implies, giant cell fibromas are characterized histologically by the presence of large, multinucleated cells representing active fibroblasts. These cells are occasionally described in other reactive hyperplasias and may represent an unusual tissue modulation of collagen-producing cells stimulated by trauma and/or inflammation.

Giant cell fibroma most often presents as a small fibrous nodule on the gingivae, tongue, palate, buccal mucosa and lip, in descending order, with a 2-1 ratio of mandibular to maxillary lesions.

Over one-half occur in the first three decades. The lesions are asymptomatic, require simple surgical excision and recurrences are rare in all reported series to date.<sup>21</sup>

## Dilantin/Cyclosporin Gingival Hyperplasia

It is a well-recognized clinical phenomenon that certain drugs have the peculiar side effect of causing gingival fibrous tissue hyperplasia. While this reaction of the gingivae has been noted in patients taking the antihypertensive agent Adalat, the anticonvulsant valproic acid and the common sedative phenobarbital,<sup>23</sup> the two medications commonly recognized as being associated with this unusual tissue response are Dilantin (sodium diphenyl-hydantoin) and cyclosporin A.

For more than 60 years gingival hyperplasia has been known to occur in some individuals taking the anticonvulsant Dilantin.<sup>24,25</sup> This hyperplastic response starts in the interdental papillae region and produces a fan-like enlargement of the fibrous tissues that can be so extensive so as to completely cover the crowns of the associated teeth.<sup>17</sup> The enlargements consist of painless, firm and relatively avascular masses of dense connective tissue. Susceptibility to the drug seems to be an individual response as not all patients taking the medication will develop gingival overgrowth.<sup>8</sup> The reported frequency ranges between 0 per cent to 80 per cent.

There have been numerous attempts to understand this tissue response, but no definitive pathogenesis has been uncovered. It is generally thought that the drug, or one of its metabolites, has some regulatory or stimulating affect on gingival fibroblasts causing these cells to produce more collagen.<sup>8</sup> One possible mechanism is an indirect enhancement of fibroblast activity by activated mast cells.<sup>25</sup> Whatever the cause, the exaggerated response of the fibroblasts seems to be related to the influence of concomitant gingival inflammation<sup>8</sup> and a positive correlation between oral hygiene and the severity of the overgrowth is well documented.

The anti-lymphocytic agent cyclosporin A was introduced in the mid 1970s as an effective anti-rejection medication for patients with organ transplants, especially renal allogeneic grafts.<sup>26</sup> Reports of a peculiar side effect of gingival overgrowth in some patients taking cyclosporin A began to appear in the literature several years later. The



first article clearly delineating the oral effects of the agent appeared in the dental literature in 1983.<sup>26</sup>

The clinical and histologic features of cyclosporin A gingival hyperplasia are identical to those described for dilantin hyperplasia. While the specific pathogenesis remains unknown, the fibrous tissue reaction seems to be related to individual fibroblast susceptibility and, like dilantin hyperplasia, induces changes, the severity of which are related to the quality of oral hygiene. Cyclosporin A gingival hyperplasia is more rapidly manifested during the first three to six months of therapy, and adolescent patients seem particularly prone to this side effect. In one large study 70 per cent of individuals taking cyclosporin A as an anti-rejection drug exhibited some degree of gingival hyperplasia.<sup>27</sup>

Both Dilantin- and cyclosporin A-induced gingival hyperplasia are treated empirically. The fibrous overgrowths seem to regress upon cessation of the medication, particularly cyclosporin A-induced changes, in which resolution can be complete.<sup>8,27</sup> Surgical intervention may be required if the bulk of tissue becomes unmanageable or esthetics are compromised, and to encourage better oral hygiene, although the tissues tend to grow back under the continued stimulation of the drugs. Clinical management after surgery can be effective with good plaque control resulting in slower regrowth of the tissues because of reduced gingival inflammation.

As with all generalized overgrowths of the gingivae, other conditions such as genetic or idiopathic gingival fibromatosis must be considered as well as the more serious complication of a generalized leukemic infiltrate.<sup>23,25</sup> Usually the clinical presentation and medical background of the patient are sufficient to develop a definitive clinical diagnosis. **Figs. 9 and 10** are examples of Dilantin and cyclosporin A gingival hyperplasias respectively.

### Peripheral Ossifying Fibroma

Of all the common and not-so-common reactive inflammatory hyperplasias, Peripheral Ossifying Fibroma (POF) has stimulated a great deal of interest and debate among clinicians and oral pathologists, and because of this it is instructive to present some background material.

Almost 40 years ago, Cooke<sup>4</sup> described two gingival "cellular fibromas" that consisted of a whorled arrangement of immature fibroblasts accompa-

nied by deposits of coarse fibred bone. At the time, he considered these two lesions to represent cellular variants of reactive fibroepithelial polyps. Stones<sup>5</sup> described lesions termed "oral fibromas," which he subdivided into hard and soft. The author felt that these particular lesions arose from either periosteum, lamina propria or periodontal ligament. The "soft fibromas" were stated to contain numerous interlacing bundles of fibroblasts and, not infrequently, areas of calcification. These lesions were said to undergo relatively rapid growth and to usually involve the alveolar region, although Stones described palatal involvement in his text<sup>5</sup> and considered these lesions to be true neoplasms. Others felt these were clinical variants of reactive hyperplasias. Recurrences were described and appeared to be associated with more rapid growth.

Lee<sup>9</sup> attempted to classify four groups of gingival overgrowths in an effort to clarify the confusing nosology that had developed concerning reactive connective tissue hyperplasias of the gingivae. In his classification, the author described a growth termed "fibroblastic." This lesion was stated to exhibit marked cellularity with frequent dystrophic calcification and corresponded to other lesions that had been previously labeled "peripheral fibroma with calcification." The duration of these fibroblastic gingival overgrowths was said to be similar to that of pyogenic granuloma, being less than three months, and they exhibited a recurrence rate intermediate between that of pyogenic granuloma and fibrous epulis. The author considered the lesions to be peculiar to the gingival tissues because of the calcific changes and proposed they be termed "calcifying fibroblastic granulomas."

It now seems obvious that Cooke, Stones, Lee and others were describing a lesion currently referred to as a peripheral ossifying fibroma, a term no less descriptive or definitive. To further confuse the picture, a number of investigators have called similar lesions "peripheral odontogenic fibromas,"<sup>6,28</sup> a practise discouraged by Gardiner.<sup>29</sup> With the etiology, and to some extent the pathogenesis, of these lesions completely unknown, their clinical, histological and prognostic characteristics warrant special consideration and their inclusion in any discussion of reactive hyperplasias.

Peripheral ossifying fibroma occurs as a localized growth of the gingivae. Over one-half are found in the inci-

sor/canine region and in one large study 60 per cent occurred in the maxillae.<sup>30</sup> The lesion can be sessile or pedunculated, the surface is frequently lobulated or papillomatous and the color can range from pink to red depending on the degree of inflammation. The growth rate shows wide variation but tends to be more rapid in those lesions that are ulcerated and inflamed. The most significant feature of this lesion is a well-documented recurrence rate of 14 to 16 per cent.<sup>29,30</sup>

While the precise pathogenesis of POF is not clear, the tissue characteristics suggest an origin from periodontal ligament.<sup>15,29</sup> In fact, the cellular nature and arrangement of the tissues in these lesions are reminiscent of similar entities derived from ligamentous structures elsewhere in the body, such as fascial and tendinous sites. Often the calcified material resembles cementum or osteo-cementum, and in some instances the clinical features suggest that the lesion has arisen from deeper structures and has grown outward to present as an exophytic mass (**Fig. 11**). This may account for the high recurrence rate, because an excisional biopsy would likely fail to include the associated portions of the periodontal ligament. It must be stressed that these lesions can exhibit relatively rapid growth, especially if inflamed and, while they are reactive in nature, can manifest alarming clinical features. Excisional biopsy must be performed to determine the true nature of the lesion and once diagnosed the area must be kept under periodic observation. Recurrences have been known to appear up to two years after initial excision.<sup>31</sup>

### Summary

Reactive inflammatory hyperplastic lesions of the oral mucous membranes are common entities. They arise as the result of normal inflammatory and healing responses of oral tissues frequently affected by chronic, low-grade traumatic events. These lesions achieve their final form and resultant clinical presentation from a combination of the anatomy, physiology and metabolism of a highly reactive oral mucosa and the nature of the insult.

The clinical significance of these reactive lesions relates to their ubiquitous nature and the fact that occasionally lesions present with ominous clinical features. In these circumstances, a clinician may be dealing with an apparent, rapidly growing erythematous and "angry looking" mass that is as much of a



concern for the patient as for the individual charged with the responsibilities of diagnosis and treatment. In many instances, removing the irritant reduces the inflammation but fails to eliminate the resultant mass of tissue. A careful history, an accurate assessment of the clinical context of the lesion and, if necessary, histological examination of the tissues, should result in a successful resolution of the problem.

In addition to the large group of common inflammatory hyperplasias, there are a number of entities that either resemble reactive lesions or are considered to represent some unusual focal reactive process, either localized or reflecting a systemic alteration of tissues. These "not-so-common" lesions are benign but may mask more serious conditions such as neoplasia. While some of these lesions are unusual or controversial, it is important that clinicians be aware of their existence, and that in the appropriate circumstances they be included in any differential diagnosis.

This paper has presented a brief review of the common and not-so-common reactive inflammatory hyperplasias of the oral mucosa. Clinical examples have been presented together with a compilation of clinical features derived from standard texts and review articles. It is hoped that this approach has provided a better understanding of these lesions and a clearer focus for diagnosis and management.

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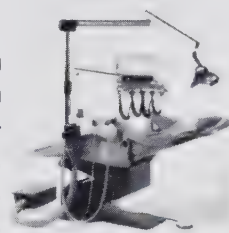
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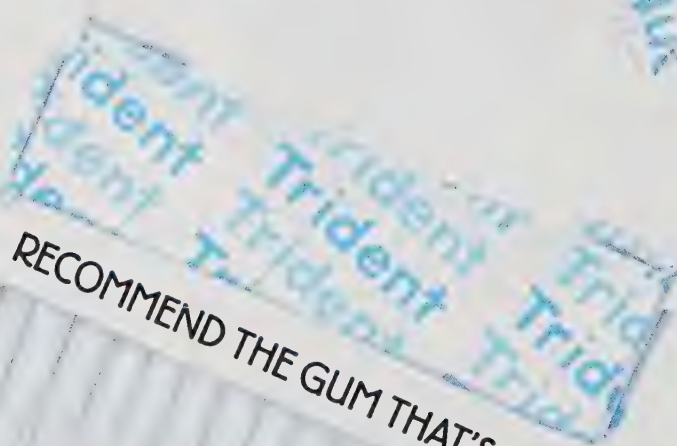
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**The Canadian Dental Association is the authoritative national voice, resource, and focus of unity for the profession of dentistry in Canada, — dedicated to meeting member needs, and the promotion and provision of optimal oral health for Canadians.**

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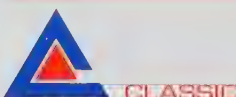
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In short, in this highly improbable scenario, all cars would be complete cars, compromising no one virtue for the sake of another.

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## IMAGE ISN'T EVERYTHING

Despite all the positive results achieved by CDA's Dental Awareness Program over the last eight years, dentistry has an image problem. While most Canadians think of medical doctors as healers, many still associate dentists with pain and discomfort. And that image is being perpetuated in the movies, on TV and in the street.

Anyone who saw the film "Little Shop of Horrors" will remember the dental office scene. The screams of the patient echoing through the reception area. The sadistic look on the dentist's face. And "MASH" aficionados will no doubt recall the episode when Col. Henry Blake had a temporary filling. He could hardly talk for the pain.

Fiction, you say. The public knows that dentistry has changed, that films like "Little Shop of Horrors" are far from reality, and that temporary fillings usually relieve pain, not exacerbate it. Maybe so. Still, why do people "have a doctor's appointment" but "have to go to the dentist"? There's an important difference here.

But there shouldn't be, and this comes from a dentalphobe. Me. Until recently, I only attended the dentist when the pain in my mouth was strong enough to overcome the fear in my head. On average, that occurred once every seven years, usually as a result of the tissue around a third molar becoming infected.

The cause of my fear was two-fold. It stemmed from the pain I'd experienced in a dental office as a child, when the rough edges of a chipped front tooth were smoothed, and from the hideous taste and feel of the fluoride applications dentists used in the '60s. I despised the stuff.

Fortunately, I eventually found a dentist I liked. One who took the time to find out why I hadn't seen a dentist in seven years. We communicated.

It was so simple, really. Pain. No problem, if it hurts just hold up your hand and we'll stop. Your feet are too high. OK, we'll lower the chair a bit. How does that feel?

Yes, my dentist probably spent more time with me than he might have spent with another, less fearful patient. And yes, it probably meant that he had to work a little longer than he wanted to on that particular day. But it also meant that I might be encouraged to attend his office for regular check-ups later on, and I did. Once every six months.

Today, after a year as the managing editor of the *CDA Journal*, I know much more about dentistry than most Canadians. I am also very aware of the many services CDA provides to the dental profession and the Canadian public. Of what the association means to organized dentistry.

It has been an interesting, educational 12 months. I joined CDA's staff at a time when the association was responding to the dental amalgam controversy, and



Terence L. Davis, BA

formulating its reasonable stand against mandatory AIDS testing. What I saw was a strong, well-run organization, a group that did a tremendous job with limited resources.

Think about it. Dental Health Month, the Dental Information System and the Dental Awareness Program are all CDA innovations. And each of these programs, according to recent public opinion polls, has been tremendously successful. The Canadian public has never been so positive or pleased about the dental care it receives.

But we still have a long way to go. Before I joined CDA's staff, I knew almost nothing about the association. Like most Canadians, I'd seen CDA's seal of recognition on toothpaste packaging, and read its statement on fluoride, but that was the extent of my knowledge. I had never really thought about who was responsible for ensuring the public's access to high-quality oral health care, or who spoke for organized dentistry.

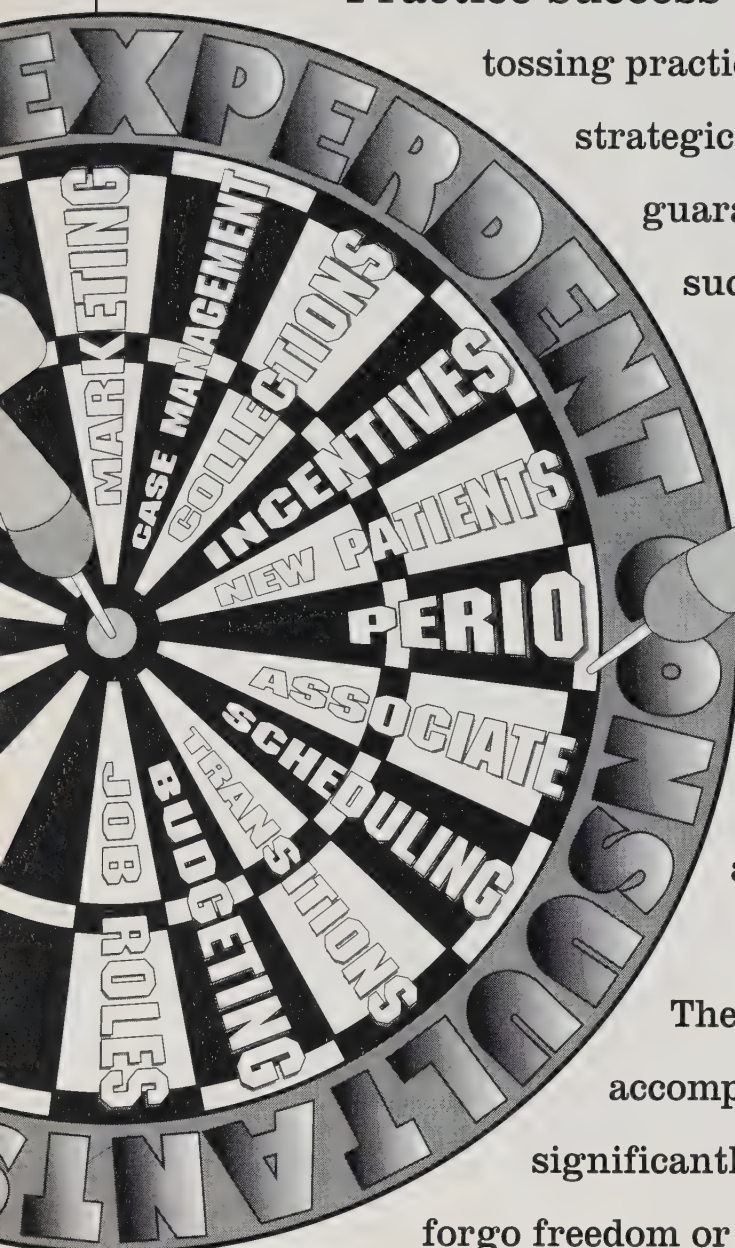
In hindsight, when I look back on the day when I decided to attend the dentist on a regular basis, I now believe that CDA's Dental Awareness Program was probably an important factor in my "conversion." I'm convinced that my dentist was influenced by the program, that it helped him to see the importance of communicating with his patients, of talking with them about their fears and concerns, of discussing the cost and effectiveness of various treatment options, of reassuring them about AIDS and other infection-control concerns. Furthermore, I'm sure that other dentists have also been influenced by the program, over the years, to the great benefit of the Canadian public.

Given the success of the Dental Awareness Program, it's unfortunate, really, that the public isn't more aware of the many positive things that CDA has done on their behalf. But the association has chosen, and rightly so, to forego blowing its own horn in favor of developing more and better programs. To serving the needs of its members.

It is even more unfortunate, however, that some of Canada's dentists seem to be equally unaware of CDA's many successes, and have chosen not to support their association. If I, a layman, can recognize what CDA has done for organized dentistry, surely Canadian dentists can do so, too. The association needs the support of all Canadian dentists to initiate new dental health programs for the '90s and into the next century, just as Canadian dentists need CDA to represent their interests and speak with a unified voice on their behalf.

Terence L. Davis, BA  
Managing Editor,  
*Journal of the Canadian Dental Association*





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# President's Column

## NO MORE FREE LUNCH

**A**n old adage came back to me last week as I was preparing to address the Canadian Dental Association's interim board meeting: "strength comes from within." It seemed to sum up everything I wanted to say in four, short words.

For CDA is an organization that is made up from within. It is a strong, unified body that works in close cooperation with its provincial counterparts to benefit the dental profession as a whole. We don't suffer from the regionalism and controversy that seem to be so prevalent in Canadian government circles today, with each province attempting to cut out its own piece of the pie.

CDA is made up of individual and corporate members. Representation on the board of governors is based on the total CDA membership of each provincial corporate body, and at least one governor must come from each province.

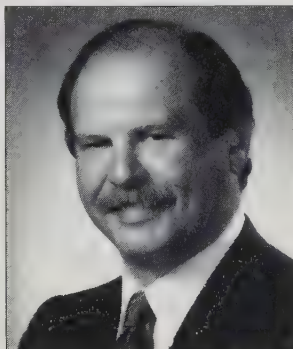
Saskatchewan, Manitoba and each of the four Atlantic provinces all have one governor on the board. The remaining four provinces, which have larger corporate memberships, are entitled to a greater number of representatives. Quebec and Alberta have three, B.C. has four and Ontario has six.

These 22 governors include the six members of the regional executive, but not the three management committee members: vice-president Ray Wenn from PEI; president-elect Bernard Dolansky from Ontario; and myself, CDA's president, from Manitoba.

One of Quebec's three governors represents that province's affiliate members. In addition, a student representative and a Canadian Forces representative each have full voting rights, and there are two non-voting board members, who represent Health and Welfare and Veterans' Affairs.

While the board is the final authority in all matters pertaining to CDA, much of the actual work is done at the committee and council level. CDA's communications department, for example, is assisted by a communications steering committee, a convention committee and a membership committee. Similarly, our professional services arm is guided by the wishes of the education, third party and consumer product recognition committees, among others – and these make up just a few of CDA's councils and committees.

Committee members are selected on the basis of regional representation as well as on their level of expertise in a relevant area. The important thing to remember is that CDA is made up of close to 200 dedicated volunteers. Dentists who have given freely



*Dr. Les Allen*

of their time to work for Canadian dentistry through their national association, and to represent the interests of their 15,000 fellow dentists. Their efforts, as well as those of our excellent staff, have allowed CDA to speak as the national voice of dentistry, focusing on the issues of importance to dentists and the profession, and ensuring the public's access to optimal oral health care.

To be sure, there are some areas where the programs and initiatives of CDA overlap with those of our provincial counterparts. But in every case –

our Dental Awareness Program may provide the best example – this works to the mutual advantage of both organizations. CDA is supportive of the provincial organizations, and we are doing our utmost to provide the corporate bodies and individual dentists with the resources they need to meet their respective goals.

The key word, here, is cooperation. While the national association and corporate bodies have had their share of disagreements in the past, we have always been able to overcome them to our mutual benefit. We work from within, by joining together for the common good. And this has made CDA a strong, dynamic organization.

But because CDA is dentistry's national voice, it often represents individual dentists from Quebec and Ontario who have chosen not to join the association. This is unfortunate and unfair. Too many practising dentists are sharing in the benefits of CDA membership without contributing to the cause. We must work to change this, to make these dentists see the light and join CDA.

I am open to suggestions. We have worked hard to make the Canadian Dental Association a strong, vibrant, progressive organization, an organization of the '90s. We must find a way to get rid of the free loaders. And we need your help. Encourage your non-member friends and colleagues to join us. Ask them to contribute their fair share to the costs of the benefits they receive from CDA simply by being a member of the dental profession.

We need the full support of every Canadian dentist to ensure that CDA continues to be a truly national professional association, one that speaks for all dentists on every important issue.

*Les Allen, B. Comm., DMD  
President of the Canadian Dental Association*



# Announcements

## NATIONAL HIGHLIGHTS

**June 4-7, 1992**  
College of Dental Surgeons  
of Saskatchewan Annual  
Convention  
(306) 244-2476

**June 18-20, 1992**  
Newfoundland Dental Association  
(709) 579-2362

**August 28-30, 1992**  
44th Annual Scientific Session  
Canadian Association of  
Orthodontists  
Calgary, Alberta  
(416) 491-3186

**August 29 - September 2**  
1992 Canadian Dental Association  
Annual Convention  
Calgary, Alberta  
Christine Leadman  
(613) 523-1770  
(outside Canada)  
1-800-267-6364 (East)  
1-800-267-6354 (West)



## June/Juin 1992

**June 13-20: Bermuda Dental Association Convention** in Paget, Bermuda. Limited attendance, for more information, contact: Lynne Brandon, CDA, CDR (519) 657-4306 or Jerry Sheppard (519) 434-1647.

## July/Juillet 1992

**July 1-4: 12th International Symposium on Dental Hygiene the Hague** will be held at the Netherlands Congress Centre in The Hague. For more information contact: Secretariat, Vam Namen & Westerlaken Congress Organization Services, "Dental Hygiene Symposium," PO Box 1558, 6501 BN Nijmegen, the Netherlands.

**July 9-11: 3rd Annual Convention of the Atlantic Provinces Academy of General Dentistry** being held at the Digby Pines, Nova Scotia. For more information, contact: Dr. Garry Condon (902) 678-7530.

## August/Août 1992

**August 7-9: 7th Annual Meeting of the International Society of Oral Oncology** on "Diagnosis and Management of Infection in the Immunocompromised Host" being held at the Catamaran Resort Hotel in San Diego, California. For more information, contact: Dr. R.B. Abrams, The Children's Hospital, 1056 East 19th Ave., Denver, Colorado, 80218, or call: (303) 861-6788.

**August 7-10: 3rd Singapore International Dental Exhibition & Conference** in Singapore. For more details, contact: SIDEC 92, Orchard Dental Centre Pte Ltd 268 Orchard Rd, #05-07, Singapore 0923.

**August 9-14: 70th Annual Dental Association of South Africa Congress** in Sun City, South Africa. For information, contact: Helmut Heydt, DASA Congress, Private Bag 1, Houghton 2041, South Africa.

**August 20-25: Canadian Society of Forensic Science Annual Conference** will be held in Halifax, Nova Scotia. For more information, contact: Fredricka Monti, Canadian Society of Forensic Science, Suite 215, 2660 Southvale Crescent, Ottawa, Ontario, K1B 4W5 or call: (613) 731-2096.

**International College of Dentists Canadian Section Annual Meeting and Convocation** being held at the Paliser Hotel, Calgary, Alberta. For information, contact: Dr. W.J. Spence, Registrar, 12A Yonge Blvd, Toronto, Ontario, M5M 3G5, (416) 487-2928.

## September/Septembre 1992

**September 17-20: 28th Annual Meeting of the Canadian Academy of Endodontics** will be held in Victoria, BC at the Laurel Point Inn. For more information, please contact: Dr. Raymond S. Greenfeld, Convention Chairman, (604) 270-8754 or Dr. Leonard Atkinson, Registration, (604) 592-2511.

**September 21-25: FDI World Dental Congress** being held in Berlin, Germany. For details, contact: Christine Leadman, CDA Conventions, 1815 Alta Vista Drive, Ottawa, Ontario, K1G 3Y6.

## October/Octobre 1992

**October 14-17: 2nd Annual Meeting of the Bulgarian Dental Association** will be held in Plovdiv and will be jointly organized with the Quintessence Publishing Group. For more information contact: Dr. J. Mihailov, Director, the Bulgarian Dental Association, 1000 Sofia, 34-A Bulgaria Ave., Bulgaria.

**October 16-17: Southern Ontario Surgical Orthodontic Study Group Meeting** in Windsor, Ontario. For details, contact: Dr. Jeff Berger, (519) 259-2632 or fax (519) 258-2637.

**American Dental Association Convention** will be held in Orlando, Florida. For information, contact: the American Dental Association, 211 East Chicago Avenue, Chicago, Illinois, 60611, or call: (312) 440-2500.

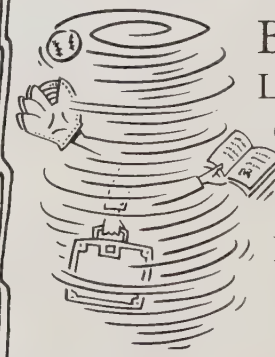
**October 28-31: 1st International Congress of the Turkish Society of Restorative Dentistry** will be held in Antalya, Turkey at the Antalya Sheraton Voyager. For more information write: Dr. Fatma Koray, Faculty of Dentistry, University of Istanbul, 34390 Capa, Istanbul, Turkey.

**October 30-31: Craniofacial Development and Anomalies Conference** will be held at the University of Alberta. For information contact: Dr. G.H. Sperber, Department of Oral Biology, University of Alberta, Edmonton, Alberta, T6G 2N8 or call: (403) 492-1624.

## November/Novembre 1992

**November 18-20: Swedental Annual Dental Fair** in Stockholm, Sweden. For details, write: Ms. May-Britt Carlsson, Press Officer, 125 80 Stockholm, S-125 80 Stockholm, Sweden.

## HOW TO BE A LOCAL HERO



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# News Update

## Former FDI Leader Dead

Dr. Gerald (Gerry) Leatherman, the executive director emeritus of FDI, died December 11, 1991, at the age of 89.

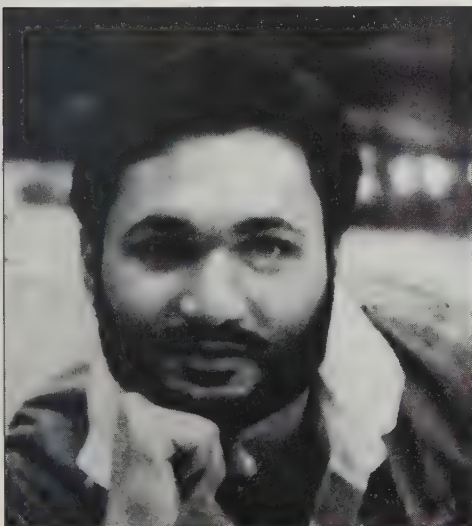
Dr. Leatherman was appointed assistant honorary secretary of the Fédération Dentaire Internationale in 1947. He became the organization's secretary general in 1952 (the title was changed to executive director in 1970), a post he held for 28 years.

Many credit Dr. Leatherman's vision and commitment to internationalism for the resurrection of FDI following the Second World War. During his tenure as the federation's executive director, he made several outstanding contributions, firmly re-establishing FDI as the world organisation for dentistry.

Dr. Leatherman was born in London, England, and educated in South Africa. He entered Harvard Dental School at the age of 17, and graduated DMD (cum laude) in 1924. Two years later he opened an office on Harley Street in London. As Dr. Leatherman's passion for oral hygiene became known, the practice blossomed.

Throughout his career, Dr. Leatherman was recognized and honored by a long list of associations and educational institutions. The Canadian Dental Association bestowed its highest honor, honorary membership, on Dr. Leatherman in 1971.

## Dentist wanted by FBI



*Dr. Kenneth M. D'Cunha*

The RCMP has requested the assistance of CDA in the apprehension of an American fugitive, Dr. Kenneth M.

D'Cunha. He is wanted by the New York City Police and the FBI for numerous counts of sodomy against young, teenage males and for unlawful flight to avoid prosecution.

The case was recently featured on the television program "America's Most Wanted," and subsequent tips indicated that Dr. D'Cunha had visited Canada. It is believed that he may be seeking employment in Canada as a general dentist, orthodontist or laboratory technician. To date, however, the provincial licensing authorities report that no one fitting Dr. D'Cunha's description has sought licensure in Canada.

Dr. D'Cunha graduated from the University of Bombay (India), Columbia School of Dentistry, and the New Jersey College of Dentistry in Orthodontics. When the warrant for his arrest was issued in July 1986, he was practising as an orthodontist in the states of New York, New Jersey and Connecticut.

Dr. D'Cunha is a male of Indian descent, born August 10, 1955, in Bombay, India. He is 185 centimetres (six feet one inch) tall, weighs 10.75 kilograms (200 pounds), with black hair and brown eyes. When last seen he had a beard and moustache.

Any information on Dr. D'Cunha should be forwarded to Corporal Marcel Deveau of the RCMP detachment in Ottawa. He can be reached at (613) 993-8362.

## Dr. Roland Vallée Named Head of Laval Dental School

A professor of operative dentistry has been named as the head of the dental school at Laval University.

Dr. Roland Vallée, a professor at the Quebec City university since 1973, will serve a three-year term. He was named to the post by the university's administrative council February 26.

A co-researcher in several studies, Dr. Vallée has authored and co-authored a number of scientific papers, primarily on geriatric dentistry. He was the president of the Quebec Order of Dentists' committee on geriatric dentistry from 1983 to 1990, and a founding member of the International Association of Gerodontia.

Dr. Vallée is a fellow of the Academy of International Dentistry, a member of the Pierre Fauchard Academy, and a governor on the Foundation of Laval University.

## "Father" of Children's Dentistry Dead at 87

Dr. Stewart A. (Sandy) MacGregor, often referred to as the father of children's dentistry in Canada, passed away March 14, 1992, in Toronto's Sunnybrook Health Science Centre.

Born in Pakenham, Ontario, Dr. MacGregor graduated from the University of Toronto's dental faculty in 1931. His dedication to the dental profession and his fellow man was evident immediately. That summer, he drove a provincial government car – with a First World War foot-powered dental drill attached to the running board – from town to town in the Cochrane, Ontario, district, serving the dental needs of the poverty stricken in community halls, churches and even stables.

The next year, 1932, Dr. MacGregor opened an office on the corner of Lawrence and Yonge streets in Toronto where, for 45 years, he restricted his practice to the treatment of children.

Dr. MacGregor organized and developed the department of pedodontics at the University of Toronto in 1943, and served as a professor and head of the department for 24 years.

His was a lifetime of service to worthy causes. Among them, U. of T., the Red Cross, hospitals, public health issues, fluoridation and the handicapped. For almost 40 years, he lectured on children's dentistry throughout Canada, the United States and abroad, and contributed extensively to the literature.

The concluding paragraph of an article Dr. MacGregor wrote for the *Journal* in 1962 sums up his philosophy on children's dentistry:

"It must be emphasized that all children should be treated with kindness, but with firmness and decisiveness as well. Father may be boss in the home, but inasmuch as this is the dentist's establishment, the dentist must be in control here. One must remember, too, that ridicule, social example and bribery play little part in helping to manage a child in a dental or any other environment. Last, but by no means least, the dentist must like or learn to like children and to respect them by always telling them the truth."

Dr. MacGregor received numerous honors from the community, his profession and his country. In 1967 he was awarded the Centennial Medal "in recognition of valuable service to the nation...as a pioneer of dentistry for chil-



“CDA is my source  
of national  
information.”

*Dr. Pam Zakarow  
Oshawa, Ontario*

*Dr. Pam Zakarow:  
General practitioner,  
equestrian — and  
member of CDA.*

*“In my practice, I need  
someone who will tell  
me what’s new and  
what’s important on  
the national scene.  
That’s CDA.”*



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educational. If it’s  
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we’ll tell you about it. It’s  
one of the ways CDA works  
for you, and for dentists all  
across Canada.*







*This 1976 photo shows Dr. Stewart "Sandy" MacGregor (left) receiving his honorary membership in CDA from the association's president, the late Dr. Lindsay Mussells.*

dren in Canada." He was a honorary member of the Canadian Society of Dentistry for Children, the Ontario Dental Association and the Canadian Dental Association.

## Mancini/Barrett Grants Help Students

Grants totalling \$4,500 from the Nicholas A. Mancini and G.W. Barrett endowment funds will allow five financially-strapped dental undergraduates to cope with the heavy burden imposed by the costs of a dental education.

Both funds are administered by the Canadian Fund For Dental Education (CFDE) for the purpose of helping dental students in financial difficulty to complete their educations.

To date, CFDE has received three letters of thanks from the 1992 grant recipients, who, as the following excerpts make clear, were each facing extremely difficult financial problems.

"I am writing to you as a second-year dental student. In January of this year, I found myself at the end of my rope. With second-term fees due, and second-term books to purchase, I realized that my funds had run out. The cost of dental school being as high as it is, even OSAP funding, as well as a private university loan, could not meet the cost of my education...I hope that one day in the future I can also reach out and help people in the manner that you have helped me"...

"This was a very difficult year for me financially. Normally, I am very proud of the fact that I have supported myself

through my university education.

"Unfortunately, this year, with my father on disability pension and my mother laid-off, accompanied by cut-backs in my place of summer employment, I found myself unable to meet the financial demands placed on me.

"The Nicholas Mancini Fund grant provided through the CFDE enabled me to purchase required textbooks which I needed since September.

"I can't thank Dr. Mancini and the CFDE enough for all the emotional and financial support which they have provided me"...

"For the past three years, we have tapped every possible financial resource in order to fund my education as well as maintain the regular living expenses of my family.

"This year our budget has been in excess of our potential income and we depleted our available funds from the bank loans which we were able to ob-

tain. We were forced to apply for a short-term loan from the local finance company (which carries an extremely high interest rate) to make it through the last semester. Your assistance could not have come at a more crucial time. I honestly don't think you could believe how relieved my wife and I were. We sat down and reviewed our financial situation and decided that with your help and cashing in our income tax rebate (cash back program) we will have just enough to carry us through until June the first which is when I begin work again.

"Words can't express how much this bursary has helped us and simply lifted the day to day pressures of where we would find the necessary funds to carry us over to the end of the school year.

"We can't thank you enough and we do want you to know how grateful we are. This type of thoughtfulness will not go unnoticed. My wife and I have discussed this on many occasions and we want you to know that when we become more financially sound we plan to become active in perpetuating these types of programs for future students. We feel they are very important and we thank you"...

The work of both the Nick Mancini and G.W. Barrett endowment funds is made possible through the continued support of the dental community. CFDE, which is celebrating its 30th birthday this year, has raised more than \$3.4 million for dental education, service and research.

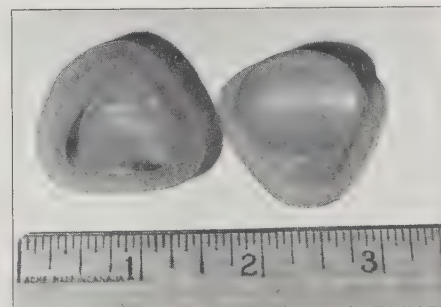
The chairman of CFDE, Dr. Gordon W. Thompson, expressed his gratitude to the supporters of the fund in its 1991 annual report, saying: "We wish to extend our sincere thanks to the many individuals, corporations and associations whose contributions make it possible for CFDE to continue its work on behalf of Canadian dentistry."

## "What's It" This Month's Mystery

This month's mystery item, shown top and bottom in the photo, is made of a pliable rubber material and was called an "isolator."

The CDA Museum wants to know how it was used and what it isolated.

If you can help to identify this device, and what it was used for, please contact Dr. P. Ralph Crawford, Journal Editor, 1815 Alta Vista Drive, Ottawa, K1G 3Y6.





# A Year of Celebration

## Louis Riel



When Canada's minister of constitutional affairs, Joe Clark, introduced a motion in Parliament March 10 to recognize Louis Riel's contribution to Confederation, few of the assembled MPs realized that Riel, albeit indirectly, was responsible for bringing organized dentistry to Manitoba.

Riel, hoping to protect the land rights of the Metis people, seized Fort Garry on the banks of the Red River in November 1869. A month later, on December 23, he became head of a provisional government for the Red River region.

In the spring of 1870, Bishop Taché of St. Boniface, Manitoba, under the auspices of the federal government and bearing a declaration of amnesty, persuaded Riel to send delegates to Ottawa. Riel's delegates obtained an agreement, the Manitoba Act, and on July 15, 1870, Canada had a new province.

That summer, to ensure peace, the federal government sent a military force, called the "Red River Expedition," to Manitoba. The force paddled its way through the great lakes and the Winnipeg River system to the Red River settlement.

By the time the force reached Fort Garry, however, much of the conflict (but not all the animosity) had disappeared. The expedition, including the Benson brothers, William and James, of Peterborough, Ontario, returned east.

James Benson, apparently having had enough of military campaigns, indentured

with Dr. Jacob Neelands of Lindsay, Ontario. He must have envisioned a future in the West, however, because in the late 1870s he returned to Winnipeg and established the first dental practice in Manitoba.

Other dentists eventually followed Dr. Benson to Winnipeg and, over the years, several young men indentured with him. In 1883, when 17 Manitoba dentists persuaded the provincial legislature to create the Manitoba Dental Association, Dr. Benson became the organization's first president. He died in Winnipeg in 1928.

## Montreal – 1622

Montreal will kick off its 350th birthday celebrations May 15, beginning 150 days of extravaganza, pomp and pageantry. Over 300 separate events and activities are planned to mark the anniversary.

The city's known history actually began in 1535, however, when Jacques Cartier visited the Indian village of Hochelaga – located at the base of the mountain that he named Mont Réal – and became the first European to set foot on Montreal Island.

More than 100 years would pass before Sieur Paul de Chomedey de Maisonneuve and about 50 associates established a mission on Montreal Island on May 17, 1642, under the name Ville Marie de Montréal. Among the missionaries was Jeanne Mance, who founded the second hospital in the New World, the Hotel-Dieu.

## Early Dentistry in Montreal



Little is known about the history of dentistry in New France. The first Canadian directory, which listed those practising the healing arts, was published in 1791. Practitioners were recorded according to their "specialty" – physicians, surgeons, accoucheurs, apothecaries and *saigneurs et aracheurs de dents* (blood letters and tooth drawers), of which there were nine.

One of the first Montreal dentists to

achieve renown was Dr. Aldis Bernard, who indentured with an American dentist before opening his own practice in 1834. When he arrived in Montreal, the city was home to 40,000 inhabitants and three other dentists, Drs. Logan, Scripture and Spooner.

Dr. Bernard maintained his Montreal practice until 1876, and was one of the founders of organized dentistry in Quebec. When the Dental Association of the Province of Quebec was enacted by the Quebec national assembly on April 4, 1869, Dr. Bernard became the first president. He was elected mayor of Montreal in 1873 – the only dentist to ever hold the city's highest office.

In the fall of 1892, the Dental College of the Province of Quebec began offering dentistry courses in Montreal, with Dr. George Beers as dean of the faculty. Instruction was offered in both English and French, and the required medical subjects were taught at McGill and Laval Universities.

## First Dental College in Quebec

In 1896, the dental college was affiliated with the faculty of medicine at Bishop's University, becoming the first university in Quebec to provide a dental course leading to the degree of doctor of dental surgery. Bishop's faculty of medicine was merged with McGill University in 1905.

Another dental first occurred in Montreal in 1892, when the Montreal General Hospital appointed Dr. R. Hugh Berwick as staff dentist, making him the first dentist in Canada to receive a hospital appointment.

Dr. Berwick obtained his dental training through an indentureship, and then studied medicine at McGill, graduating in 1891. He decided to confine his dental practice to oral surgery, which, by modern interpretation, probably made him the first dental specialist in Canada.

## Montreal Dental Society

Organized in 1871, the Montreal Dental Society was the first local dental society in Quebec. During its second meeting, the society initiated a system to monitor individuals who failed to pay their dental bills. A "Black Book" was used to record the names of non-paying patients, and copies were sent to society members. No doubt, it marked Canadian dentistry's first attempt at credit rating and bill collecting.

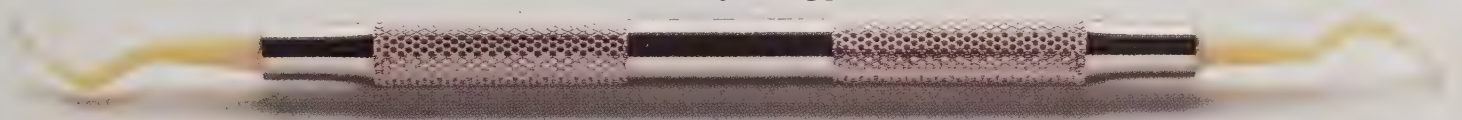
*Much of the information contained in this column was taken from A History of Dentistry in Canada by D.W. Gullett.*



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*Dr. Tillman Kershaw  
Niagara Falls, Ontario*

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# *CDSPI Reports*

## Dentists United

**D**entists across Canada may not agree on many things, but they have, over the years, agreed that acting together as a professional group has many advantages over individual actions in many areas, including insurance. In 1959, dentists united to form the Canadian Dentists' Insurance Program. CDIP is now the premiere professional association insurance program in the country, offering 12 different plans at extremely competitive rates.

However, recent changes in three of the 12 plans have inspired insurance agents and brokers from across Canada to send solicitation letters to dentists. Some promise lower premiums, others offer rate discounts for the first year or two. In general terms, these are all efforts to not only get the insurance business of Canadian dentists, but also to reduce the effectiveness of the group buying power of CDIP. The unified efforts of dentists since 1959 are what has made CDIP virtually unbeatable in terms of coverage, rates and service for all these years. And that fact hasn't changed. If anything, before the end of the year, there will be a stronger and better CDIP to serve the needs of the profession.

### **Dentists United Means Better Service**

When a dentist deals with Canadian Dental Service Plans Inc. (CDSPI), the administrator of CDIP, he or she deals with an organization with an unequalled knowledge and understanding of the dental profession, and this can be very important in the final analysis. For example, CDSPI has a greater knowledge of dental claims traffic than any agent or broker. This knowledge is invaluable to you when discussing proper levels of coverage, whether it be long-term disability, office overhead expense, office contents or other insurance requirements. While agents and brokers can create scenarios on a "what if" basis, CDSPI can provide specific examples based on actual claims experience. Our specialized knowledge enables us to provide a higher quality of information, which, in turn, enables you to make informed decisions when planning your insurance.

CDSPI operates a free insurance review service staffed by insurance experts who will evaluate the pluses and minuses of the insurance plan you are evaluating. They will provide you with an unbiased, written in plain English analysis of any insurance proposals you may be considering.

### **Dentists United Means a Better Future**

Rehabilitation is an important part of our life and is a cornerstone of our disability insurer's approach to disability. Prudential will be working to help dentists get back to work sooner through their field rehabilitation unit, which includes nurses, occupational therapists and physiotherapists. Prudential Group Assurance was selected by the Canadian Dental Association and CDSPI, in part, because of their ability to provide this service.

With more dentists getting back to work, there will be fewer dollar claims being paid and thus better claims experience. This improved experience will help stabilize rates in the future. Experienced consultants in the life and disability insurance field now believe that CDIP's experience has stabilized and that the premium rates have been set at a level which can be maintained over a long period of time. This is the same approach that has given dentists unparalleled stability in malpractice rates for years.

### **Dentists United Means Fairer Rates**

All CDIP premium rates remain competitive. Over the long term (25 - 30 years), the rates you paid with CDIP were substantially less than those of private insurers. For example, with the CDIP life plan, the rates have been structured on the basis of a 'step rate' concept. This means that you pay a lower premium at a younger age and defer the higher premiums paid at an older age as much as possible. By adopting this principle, you avoid over paying at a younger age, when you can least afford it. This also means lower net costs to participants over the long term.

### **Dentists United Means Better Coverage**

Since there has been a lot of confusion about the life and disability plans, the following is an outline of the ways in which these plans are designed to help dentists.

First, an income ratio guide is now used to help you calculate the amount of new coverage to apply for under the LTD plan. Using the guide, you can see at a glance the amount of monthly benefits you will qualify for based on your level of annual income (after business expenses, pre-tax).

Following the income ratio guide ensures that you will not be over or under insured. The guide is as generous as those of private plans. If you decide to leave CDIP, it is highly unlikely you will get a higher benefit privately.

Second, if you become disabled as a result of a sickness or injury, are limited in the performance of the duties of your regular dental practice and suffer at least a 15 per cent net income loss, you are eligible to receive benefits. You are eligible for these residual benefits as soon as you become partially disabled and have fulfilled the normal waiting period and loss of income requirements, even if you have not been totally disabled at any time.

Some individual plans require that you must have been totally disabled before you can begin residual benefits. In other words, you must be completely off work before you begin getting payments. CDIP's elimination period begins the first day you work a half-day.

Third, CDIP provides a retroactive refund of payment for waiver of premium claimants. This retroactive refund dates back to the first day of disability. Once you have qualified for waiver of premiums by being disabled for a continuous six-month period, you will receive a refund of all life and disability premiums paid during your disability.

Fourth, CDIP provides increased coverage, with no medical examination for a longer period of time. The future insurance guarantee (FIG) is now a rider option and is now available up to age 50. Previously, FIG was unavailable after age 40.



There are many other improvements in CDIP for 1992, such as a cost of living adjustment (COLA) on a compound interest basis, exclusion clauses, office overhead expense insurance, reimbursement for maternity leave, basic life coverage and long-term disability insurance coverage for new graduates without evidence of insurability, plus lower premiums for general insurance plans.

## Dentists United Means CDIP Keeps Getting Better

Not only are you better able to custom tailor your insurance needs – adopting coverage to suit your individual requirements – you have more choices than ever before. Plus competitive rates. Plus future stability. And in the near future: higher maximums on some plans, new additions to others and a special coverage all dentists should have that is not available anywhere else. A special announcement is to be made shortly.

Both CDA and CDSPI have been working hard to ensure that CDIP remains the premiere professional insurance program in the country now and in the future. If you have any questions or concerns, call CDSPI toll-free and a personal service representative will be pleased to assist you.



## CANADIAN DENTISTS' INSURANCE PROGRAM NOTICE OF COURT APPLICATION

The Canadian Dental Association and its Executive Council have applied to the Ontario Court of Justice (General Division) for determination and confirmation of various legal issues regarding the authority of the Executive Council to make use of surplus funds arising under the CDIP life and disability insurance plans for the benefit of the plans and the participants, and of the rights and obligations of the Executive Council and others with respect to the surplus funds. All of the ten provincial dental associations have retained legal counsel, and are participating as parties in this application proceeding. Any individuals who currently maintain, or have previously maintained, insurance coverage under any of the CDIP insurance plans and who are interested in participating in this application, or would like more information about the application, may write to either the Canadian Dental Association at 1815 Alta Vista Drive, Ottawa, Ontario, K1G 3Y6, or Canadian Dental Service Plans Inc. at 100 Consilium Place, Suite 710, Scarborough, Ontario, M1H 3G8. To assist us in responding to your inquiries, please write "CDIP Court Application" on the outside of the envelopes.

## CDA Retirement Savings Plan

Unit values: (Funds are valued weekly)

| Fund                 | Unit values as at |                   |
|----------------------|-------------------|-------------------|
|                      | March 31, 1992    | February 29, 1992 |
| Bond & Mortgage Fund | 91.19097          | 92.55137          |
| Common Stock Fund    | 17.46478          | 18.13505          |
| Money Market Fund    | 59.90094          | 59.58185          |
| Balanced Fund        | 34.62986          | 35.49158          |

| G.I.C. Fund<br>Term | *Interest rates as at |                   |
|---------------------|-----------------------|-------------------|
|                     | March 31, 1992        | February 29, 1992 |
| 1yr                 | 7.65%                 | 6.85%             |
| 2yr                 | 8.20%                 | 7.35%             |
| 3yr                 | 8.65%                 | 7.85%             |
| 4yr                 | 8.85%                 | 8.10%             |
| 5yr                 | 8.90%                 | 8.35%             |

(\*rates subject to change without notice.)

Total Assets (market value) of the Plan as of

| March 31, 1992   | February 29, 1992 |
|------------------|-------------------|
| \$160,430,253.60 | \$160,058,846.30  |

For further information:

Write:

or phone, toll free:



**CDSPI**  
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M1H 3G8

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# Letters/Courrier



## ■ Magnification

Is magnification only for dentists with poor vision or those over the age of 40? No. I have good close-up vision, but still use magnification routinely for numerous dental procedures.

I am sure we can all remember our dental school days, when we were told, "If you can't see, you can't do it."

Several years ago, I watched a video on porcelain veneer technique, which advocated the use of magnification in the preparation and finishing of the veneers. Originally, I bought binocular magnification to do the veneer work, but slowly started to use it more and more for all types of dental procedures.

There are many types and brands of magnification aids on the market. I advise one which is as distortion free as possible. My choice was the Zeiss binocular type (eye-glass supported), with 4.3X magnification. I tried the head band model, but found it too heavy.

With routine magnification, you will find many procedures easier – from refining shoulder preparations to placing pins, inserting cements and liners in tight spots, removing granulation tissue while doing an apicoectomy and removing calculus. When carving amalgam, the grain looks like gravel.

Magnification allows the operator to see better, with far less eye strain, and the patient benefits by receiving better treatment.

*Dale Fiolek, DDS  
Truro, Nova Scotia*

## ■ Youth and the Future

I share your concern and chagrin, as expressed in your editorial in the February issue of the *Journal*, over the trend among recent graduates and young professionals to shun involvement in their professional organizations when membership is on a voluntary basis (Crawford, P.R., Youth, Our Hope for the Future (editorial), *J Canad Dent Assoc*

58(2):79, 1992).

"Why are they doing so now?" you ask, and proceed to touch on what I believe are the core issues. But you end up dismissing them, because: "All our instincts tell us that none of those positions make much sense." You subsequently ask, "What's the problem, then?"

With your permission, I will attempt to answer the latter question, although a detailed response would probably require much more space than you allot to a letter to the editor.

I am convinced that the "blame," if it can be placed on any one group, belongs to the "establishment," which has allowed professionalism and professional pride – esprit de corps and elan, if you will – to decline, eroding the foundation stones on which a profession rests.

Did we, the establishment, having become comfortably complacent during the prosperous post Second World War years, feel no need to reach out to our young dentists, thereby creating the impression that we really did not need their involvement? Or did we unwittingly encourage a "what's in it for me generation" by increasing our emphasis on marketing at the expense of ethics, morality and social responsibility? Did the establishment suffer from a lack of exemplary leadership, leading young professionals to accept the "futility of trying to fix things?" Or did we adopt the attitude that they had to mature before they could be trusted with the decision-making process?

We must attract rather than appeal to our youth. Gain their support by exemplary ethical and moral behavior in addition to teaching and demanding technical excellence. We do need "their new knowledge, their keen minds, their steady hands and their vitality," but we also need that sense of professional fraternity, mutual respect and concern for the public that we claim as our hallmark.

Only then can we anticipate and, hopefully, realize that Talmudic quotation with which you end your editorial, particularly that latter portion: "Blessed is the generation in which the young listen to the old."

*Morton R. Lang, B.Sc., DDS  
Montreal, Quebec.*

## ■ Malignant Hyperthermia

The recent article by Drs. Hass, Young, and Harper "Malignant Hyperthermia and the General Dentist: Current

Recommendations," published in the January 1992 issue of the *CDA Journal*, was a pleasure to read. It was very informative and presented in a context that was very germane to the practising dentist. A logical and easily adopted protocol was proposed for dental practitioners treating malignant hyperthermic patients (unequivocal/equivocal).

However, ketamine was categorized in the article as an agent that is absolutely contraindicated in treating malignant hyperthermia-susceptible patients, and, depending on the particular reference cited, this is not always the case.

It would seem intuitively obvious that ketamine is a drug that one would prefer not to use in treating MH patients, due to the possible misinterpretation of the early signs and symptoms classically associated with a malignant hyperthermia crisis. When accurate diagnoses are essential in formulating appropriate treatment regimens, particularly in life-threatening situations, one endeavors to simplify the task of differential diagnosis.

In rare situations, however, having weighed the risks and benefits of using ketamine in malignant hyperthermia-susceptible patients, I have had occasion to use ketamine with good success, as I know others have.

Assuredly, one could not conclude that ketamine is a safe agent for treating MH-susceptible patients, luck may have been the mitigating factor.

An elaboration on why ketamine has been classed with the MH agents that are absolutely contraindicated would be appreciated. Is there a documented case of a malignant hyperthermia crisis that was a direct result of ketamine use?

*Barton E. McGirl, DDS  
University of Pittsburgh*

## ■ Author's Response

As noted in the correction published in the April issue of this journal, we are in agreement with you that ketamine may be used safely in patients with a history of MH. In the past, ketamine was considered to be absolutely contraindicated for use in these patients. This originated from ketamine's stimulatory effects on the sympathetic nervous system which, in turn, could cause an increase in circulating catecholamine levels. These elevated levels were considered a possible trigger of an MH reaction. This was the primary reason why



ketamine was believed to be contraindicated, and therefore we originally included it in our list.

More recent experiments have shown that ketamine does not induce an MH response in susceptible porcine muscle. Furthermore, an MH reaction has not been documented, clinically, as a result of ketamine administration. This has led the Malignant Hyperthermia Association of the United States to recommend that, indeed, ketamine is a safe agent to use in MH-susceptible patients.

#### Editor's Note

*Ketamine's inclusion in the list of agents that are absolutely contraindicated in the treatment of malignant hyperthermia-susceptible patients, published in Drs. Hass, Young and Harper's article on "Malignant Hyperthermia and the General Dentist," occurred as the result of an editing lapse. The Journal regrets the error.*

#### ■ Amalgam Fees

I was astonished to read the letter submitted by Dr. Kim Scott of Alberta (Amalgam Fees), which was published in the February 1992 issue of the *CDA Journal*.

Dr. Scott bemoans the fact that he "loses money" when he does amalgams, and further suggests that the fees for these restorations should be two to three times higher to be profitable.

Such a notion is absurd, and would very quickly put basic restorative dentistry completely out of reach of most ordinary folk. Dr. Scott seems to be preoccupied with the bottom line on an hour-by-hour basis, rather than looking at the overall picture. A realistic, experienced practitioner knows that, depending on a number of variable factors, some procedures are very profitable while others may be less so. "You win some you lose some," in other words.

Looking at every hour as a winner or loser will quickly take the pleasure out of Dr. Scott's chosen profession, especially if dollars are the focus.

Dr. Scott will be amazed at how quickly fees build when proficiency develops with a reamer and file, or how soon the dollars will come when the removal of impacted eights are competently performed. Will Dr. Scott reduce the fees for the much more profitable crown and bridge procedures, that he must do from time to time, so that each hour balances out at just the right profit margin?

I would strongly urge Dr. Scott to take a better look at how he handles his practice overall, as opposed to using amalgams as the scapegoat for his financial shortcomings.

I would further suggest that he consider the public perception of a professional who triples his fees for a treatment that is becoming increasingly suspect as a potential health hazard in the eyes of many people.

In closing, although I don't know what the wage guidelines are in Alberta for dental personnel, it seems that the \$50 that Dr. Scott pays his staff of four is a relative pittance considering that his income is so dependent on their help. I wonder, are any of those staff certified assistants? Do any directly produce income for Dr. Scott (prophies, etc.)? Or is his entire income generated by four amalgams per hour?

Lorne Berman, DDS  
Sechelt, B.C.

#### ■ Clindamycin and Dry Socket

As a practitioner who has had more than a casual interest in the subject of dry socket for the past 30 years,<sup>1,2,3</sup> I feel compelled to respond to the article by Chapnick and Diamond that appeared in the January 1992 issue of the *Journal* (Chapnick, P. and Diamond, L. A review of dry socket: A double-blind study on the effectiveness of clindamycin in reducing the incidence of dry socket. *J Canad Dent Assoc* 58(1):43-52, 1992).

I should preface my remarks by indicating that I have the deepest empathy with the authors in attempting to shed additional light on this persistent nemesis of the exodontist. Clearly, any new information or clinical research which adds to our ability to prevent this aggravating complication to tooth removal is most welcome. However, in examining the manuscript, I find some apparent shortcomings in the scientific objectivity of this study.

First, the authors state that the study was double-blind in its construction. In their discussion section, they state that a small square of Gelfoam soaked in clindamycin, provided as a suspension, was placed in the socket on one side of the mandible while Gelfoam soaked in saline was placed in the contralateral socket.

When I mix clindamycin powder, taken from a capsule, with saline, it appears slightly milky, whereas the Gelfoam and saline appear clear. Thus, I was able to tell which was which by simple observation. If the investigator can identify the material he or she is

using, then, by definition, the study is not double-blind. The word suspension implies that this was the method used.

Surprisingly, however, in the section on materials and methods, the suggestion is made that the clindamycin was used as a solution. To me, this means the injectable form of clindamycin phosphate was the test material. It comes in a vial as an absolutely clear solution, which would make it indistinguishable, visually, from normal saline. However, the authors indicate that "Both the surgeon and the patient were unaware as to which surgical site received the clindamycin." To ensure that this is so, and in keeping with sound research protocol, it is incumbent on the investigators to have the test material (clindamycin) and the placebo (saline) prepared in identical, numbered vials and according to a randomized distribution. Nowhere in the paper is it stated that this is the case.

Further, several variables were allowed to enter into this study, and these factors cloud its integrity. For example, all patients received systemic antibiotics (either penicillin or clindamycin) for seven days postoperatively. Additionally, each socket was irrigated with 3.0 mL of Betadine solution just prior to closure. Moreover, a single dose of corticosteroid was administered intramuscularly at the time of surgery. Two different local anesthetic solutions were used for the surgery. One of the male patients was HIV positive.

To suggest, therefore, that the apparent reduction in the incidence of dry socket is attributable to the topical use of clindamycin is stretching the reader's credulity. Had the investigators limited their study to healthy subjects, who were not receiving any other drugs pre- or postoperatively, except the topical antibiotic being studied, who did not have socket irrigations with a topical antiseptic, then any apparent reduction could more readily be attributed to the study material being used (clindamycin topical suspension). As it stands, it is anybody's guess which factor can be credited with the apparent benefit.

In defence of the use of tetracycline (topical), which I have used for 30 years, I noted with interest the authors' critique of this material in their literature review. Boyne and Kruger used solid cones in their extraction sockets in their study. This form of antibiotic would obviously carry the same disadvantages evidenced by the historically earlier use of sulpha cones for the same purpose – the persistence of solid parti-



cles of the material held together by a bonding material. Quinley et al used solid tablets of tetracycline to place in the socket. It is little wonder that one of their observations of the so-called "foreign body reaction" was described as "...unabsorbed Achromycin. The reaction manifested itself after several weeks when a hard, insoluble, black, tarry-looking substance sloughed from the wound."

The method used by myself, Hall, Sorenson and others is to make a suspension of the powder from a tetracycline capsule, mixed in saline and place the square of Gelfoam in the socket. If prepared in this way, the technique does not carry the undesirable sequelae alluded to by the authors. Thus, I must challenge the allegation by Chapnick and Diamond that "...the latter problems would cast doubts on its general use."

In summary, this criticism of the article should not be construed as a petulant attempt to discredit the effort put forth by the authors. As members of the health professions, we only want what is best for our patients. If newer knowledge can bring improved prophylactic measures toward eliminating the painful sequel to tooth extraction commonly known as dry socket, I would be the first to applaud. However, I do believe that the scientific principles of absolute objectivity must be strictly observed if we are to recommend new measures to the profession and the patients we serve.

A.E. Swanson, DDS, MS, FRCD(C)  
Vancouver, B.C.

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## Authors' Response

In response to the letter of Dr. Swanson, I must clear any misconceptions or concerns about our "double-blind" study. Dr. Swanson is correct that clindamycin was in solution form (clindamycin phosphate), not "suspension," and was thus indistinguishable from a normal saline solution. The only persons aware of the contents in the containers used to soak the Gelfoam

sponges was the circulating operating-room nurse, who recorded the location and contents of each dish before and after each operative procedure. The solutions and containers were altered and rotated prior to every surgical event. Thus, only the circulating nurse was aware of the intra-operative solutions and positions, and these were recorded discreetly during the months of our study. As such, the shortcoming alluded to by Dr. Swanson was incorrect and this was a true double-blind study. The use of the term "suspension" in our article was confusing and inappropriate, and we apologize for this and for not more completely describing this entire recording technique for the benefit of the readers.

We are indeed aware of the other variables which may have affected the results, however, the local anesthetics, systemic antibiotics and corticosteroids did not cloud the integrity of our study. Since they have been routinely used by us and several of our colleagues, and this is an accepted protocol in the sur-

gical removal of bony impacted 3rd molars, the incidence of alveolar osteitis has not been suppressed. We do agree, however, that the use of Betadine solution as an irrigant prior to closure may affect our results and a study is currently being conducted concerning this variable.

We are also aware of the methods and studies of Swanson and others, and have at times experimented with them. In our hands, the results were not as rewarding. Thus, we were prompted to seek other means to improve patient care.

We appreciate the sincere interest and review by our colleague in British Columbia. It is rewarding to learn that others are as concerned as we are about this persistent nemesis of the "dry socket." It is through this dialogue and CDA and provincial meetings that we can share our concerns and inform the profession of improvements in patient care.

Paul Chapnick, DDS, FRCD(C), FADSA  
Toronto, Ontario

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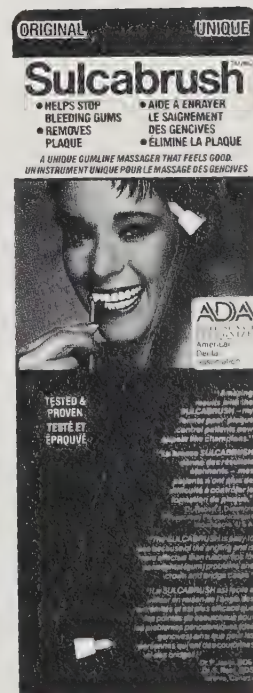
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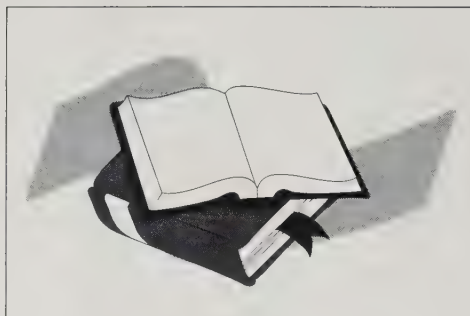




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ECONO Package 4506, consisting of Coachman IIE chair, LFII light, Spirit E OTP with 2 hp positions, Act II stools and ECONO cuspidor with vac pack including 1 Hve, 1 Salavia ejector, 1 3-way syringe and toeboard tilt.

or

. . . programme 2 Siemens/Pelton

**6.95%** (36 month term with 10% down)

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Electric Limited retail price catalogue are qualifying for this programme.

**Clearly the best solution.**



# The DAP Advisor

*The DAP Advisor offers information, ideas and advice to improve dentist/patient communication, raise awareness about good dental health, and help your practice become busier.*

From beginning to end, the typical dental visit is packed with opportunities to communicate with the patient. It is up to you and the members of your dental team to make the most of them.

## Patient Communication: Opportunities Knock

The typical dental visit affords you and your team a wealth of communication opportunities. In fact, from the moment the patient approaches your office, to the moment he or she departs, you and the members of your dental team have the chance to reach out and communicate. What do you need to make the most of these communication opportunities? Well, it helps if you and your staff have a commitment to interactive communication, a belief that the patient comes first, and enthusiasm and sensitivity.

Here are some of the patient communication opportunities that can occur in a typical dental visit:

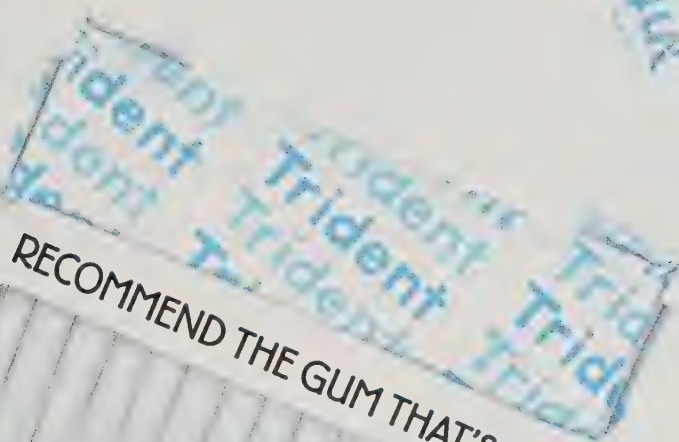
- **The Door:** A blank door communicates nothing about your practice, but a door that has information on it – your name, office hours, signs saying “Please Walk In” and “In Case of Emergency Call,” and a message promoting good dental health – can be inviting. It also conveys the message that yours is a caring, accessible practice. For first-time patients, a “communicative” door provides a good first impression. For regulars, such a door can help to reinforce their confidence in your practice.
- **The Reception Area:** In all likelihood, the first person a patient sees on entering the reception area is the receptionist – the front-line member of your dental team. The receptionist can help establish rapport and put patients at ease by greeting them warmly by name, and offering to answer any questions they might have. In addition, the reception area itself can convey a great deal about your practice. If the room is attractive and comfortable, it can contribute to a patient’s sense of security and well-being. What about the walls? Blank walls, and even those adorned with decorative pictures, are not very communicative. Walls that say something, however – ones with bulletin boards containing pertinent and interesting dental information, or a poster promoting good dental health, for example – take advantage of the inherent opportunity to communicate. So can the reading material on good dental health that you have thoughtfully provided in the waiting room.
- **The Operatory:** The patient’s name is called – the cue that treatment is about to begin. For some patients, this can be an unnerving experience. You, your hygienist and your dental assistant can help to calm the situation by doing everything in your power to ease the patient through treatment. A patient is much more likely to feel comfortable with their situation if they are apprised of what you are going to do before you do it, and if you discuss things with them at eye level instead of looming above them. After treatment, you have the perfect chance to talk to the patient about his or her dental health and solicit any questions they might have. In so doing, you help to educate and inform patients, as well as building or consolidating rapport.
- **On the Way Out:** Treatment completed, the patient once again finds him or herself in the reception area. At this point, the receptionist can ensure that the entire dental visit lingers in the patient’s mind as a pleasant memory. First, there is the matter of payment. Patients are apt to feel that treatment is expensive, so it is vital that their bill states exactly what they are paying for. The patient should also be clear on your payment policy. (Is it easy to understand? Is it written from the patient’s perspective?) And, the receptionist should offer to explain both the bill and the practice payment policy, and give patients the chance to ask about anything that is unclear or confusing. Then there is the question of booking the patient’s next check-up. There are different schools of thought on the subject, and different recall approaches. Whichever one you choose to use, it will help if the patient is aware of your procedure and has a good idea of what to expect.
- **The Door Revisited – and After:** Exiting the reception area, the patient closes the office door. On it, along with all the other messages, is a simple sign that says: “We Welcome Referrals.” This can plant an idea in the patient’s head. If the patient is pleased with your practice, he or she may well pass on the good word about it to family, friends, and others. Conversely, a dissatisfied patient may broadcast their displeasure and, unfortunately, you may not always hear about it. So follow up on no-shows and patients who fail to book recalls. In that way you can help to keep the lines of communication open between your practice and your patients, and take appropriate action to help ensure patient satisfaction in future.



*The DAP Advisor is a service of CDA's Dental Awareness Program, an ongoing campaign dedicated to helping all Canadians keep their teeth Good For Life.*

*\* Back by popular demand. This DAP Advisor was first published in the June 1990 CDA Journal.*





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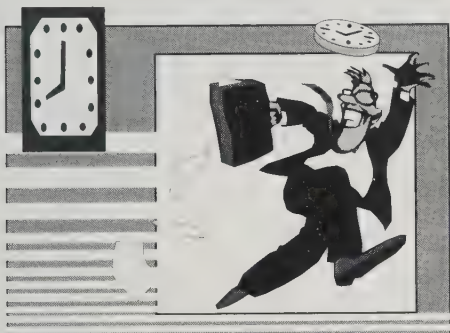
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# Practice Management & Success

## Making Every Minute Count: Effective Time Management

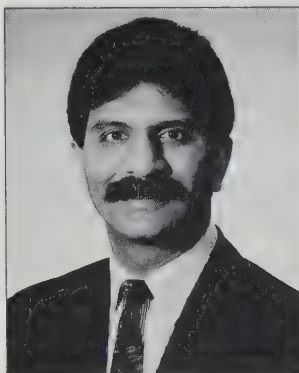
Although the subject of time management has been discussed for years, it is still a hot topic. People seem to have an insatiable appetite for information that can help them to sort through the ever-growing demands on their time. For time flies. And in the '90s, it's not just flying when we're having fun. Whether we're out playing golf or milling through the ever-growing pile of paperwork on our desks, there just isn't enough time to get everything done. We just can't seem to get enough of this most valuable resource.



In reality, we don't have any less time now than we used to have 10 years ago. There are still only 24 hours in any given day, seven days in any given week, and 365 days in a year (except leap years, when we're blessed with an extra day). What we do have, though, is a desire to accomplish more within the same amount of time.

In the business world, the need to boost productivity, a '90s reality, is amplified during these recessionary times. According to one U.S. study, today's economic pressures have nudged work hours up 20 per cent and "stolen" 32 per cent of our leisure time.

Given that time is a fixed resource, we must learn how best to manage and control it by becoming more efficient and effective, and by eliminating trivial, unimportant tasks. If you're one of those dentists who's mystified by the "fact" that everyone else seems to have enough hours in the day, you're not alone. You're a victim (one of the many) of allowing time to manage you rather than insisting that you manage time. Until you realize that the cornerstone of



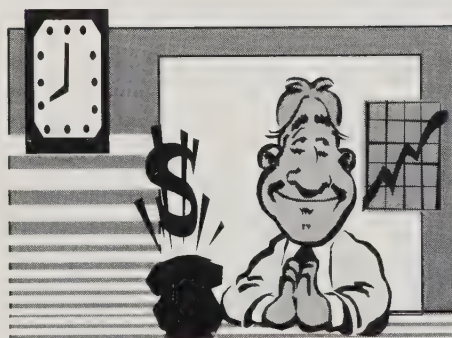
*Imtiaz Manji  
B.Sc.  
President of  
ExperDent  
Consultants  
Inc.*

time management is managing yourself, you'll be caught in an entangled web. And recognizing that there will never be enough time to "do it all" is the first step in setting yourself free.

### Identifying and Purging Time Wasters

Step back from your practice, if you can, for a few moments. Can you think of obvious time wasters that are having an insidious effect on your productivity? If staff meetings come to mind, it's no surprise. This isn't to say that staff meetings aren't useful – planned, agenda driven, results-oriented staff meetings are invaluable – but only that dental offices are often plagued by unproductive meetings, where priorities aren't established, wonderful ideas are raised but never implemented, and nothing is resolved. The same scenario usually repeats itself (or it gets worse because staff have become increasingly disillusioned) at subsequent meetings.

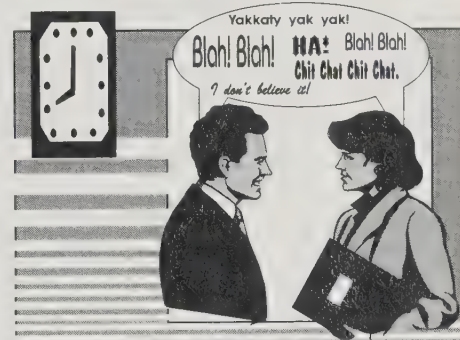
### Collections



Collections are consummate time wasters. Each month, dental practices across the country unfailingly subject

themselves to the vicious cycle of the collections process. They spend an inordinate amount of time chasing patients for payment, time that would be far better spent tackling the root of the problem – the fact that patients were allowed to leave the dental office without paying their bill. Collections are likely to be a problem in your office no matter what you do, but you can set some ground rules to control and contain it. You can avail yourself of the opportunity to make the problem as small a headache for your practice as possible by opting for time rather than crisis management. (For more information on collections, please refer to the December 1991 issue of the *Journal* 57(12):927-929.)

### Socializing



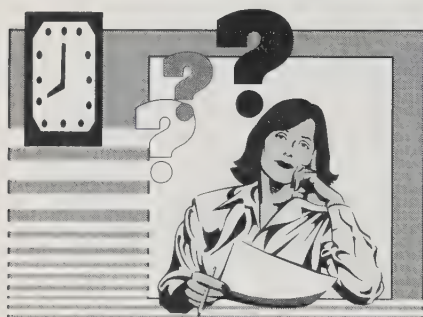
Certainly, it's important that your team have a harmonious, friendly, social atmosphere in which to work. This does wonders for morale and job satisfaction. But there is a fine line between a healthy level of social contact and a hazardous one. It's hard to define when socializing is taking a negative toll on productivity, but there are some warning signals. If your staff aren't completing their important tasks on time and are constantly running behind schedule, keep your ears open for how much idle chit chat is occurring. It could be that a little less talking would render a lot more doing. (If you suspect excessive socializing to be a prime time waster, make your staff aware of your feelings but do so with great sensitivity.)

A common time waster for new employees is lack of knowledge. How often



do you or your team take the time to properly train new staff? All too frequently, newcomers are not oriented to the ground rules of the practice and, as a result, they end up immobilized, frustrated, and discouraged when they should be breathing fresh air into the atmosphere. It's far better to invest time in solid training and orientation when new staff arrive than it is to have them "rob" you of time later on by trying to learn haphazardly what is expected of them.

## Ineffective communication



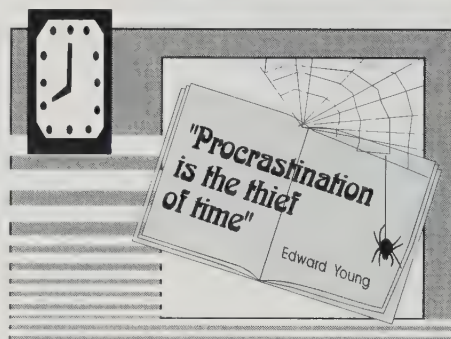
Ineffective communication (or simply an absence of communication) has got to be one of the most noxious time wasters, often manifesting itself in the exchanges between the clinical and administrative areas of the practice. Consider the oft-played out scenario of pre-booking appointments. The hygiene department asks the patient not to leave the office without booking a subsequent appointment, but offers no more direction than that. When the patient arrives at the front desk, the person behind it is left wondering when the appointment should be, what it will be for and how many units of time will be needed. Much time is lost in scrambling for this information.

By creating discipline and accountability, these mini dramas can be eliminated. Staff should know exactly what role they play in forging a winning team. And they should be instructed not to compensate for one another. If the front-desk person is at a loss because the hygienist has "dropped the ball," she should put it back in the hygienist's lap. When staff are given responsibility and the authority to take initiative, you'll find they will be quick to do so.

Edward Young once said, "Procrastination is the thief of time." We're all guilty of putting off until tomorrow what we could do today, but some of us are worse culprits than others. Usually there are logical reasons for deferring tasks: we are afraid of failure, we want

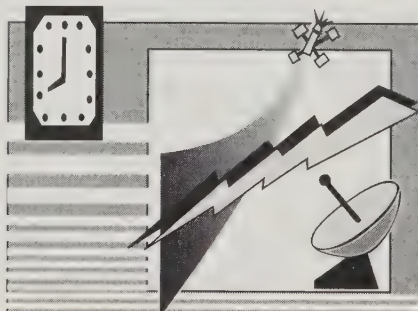
to avoid responsibility, the time isn't right or we simply don't enjoy doing them. In the dental environment, it's easy to understand why procrastination is such a toxic force. If the appointment book needs to be filled for the next day or the unpaid accounts are mounting and need to be collected, you're not likely to have a lineup of volunteers to handle these unpleasant chores.

## Procrastination



You can overcome procrastination, but it takes uncompromising diligence and determination. Setting deadlines for each task is a good starting point. It also helps to break large goals into smaller ones. Cutting ambitions down to size makes reaching them seem less elusive. For example, let's say your goal is to fix your continuing care department by ensuring that there is no recall problem. That's an immense goal for most practices. If you want to reactivate your charts, first figure out how many you have. If there are 2,000, you may decide that each person on your team will be responsible for three charts per day and you'll do 15. This allows you, on a daily basis, to manage those charts. If you accomplish your little goals, by meeting your daily targets, your long-term goal will ultimately take care of itself.

## Interruptions and crises



Interruptions and crises are notori-

ous time wasters. Because they cannot be anticipated with pinpoint precision, they are often responsible for derailing otherwise effective time managers. The key here is to accept that interruptions and crises won't go away and, therefore, must be managed. Though it's impossible to know when these distractions will occur, you can be sure of one thing – they will. The best thing you can do is to schedule your time in a productive but flexible manner, so that the emergencies can be slotted into your work day without wreaking total havoc.

Easier said than done, you're thinking. But there are sound strategies that can guide you to turning problems into opportunities and help you to keep your goals and behavior in line. One device is to just say no. If the interruption isn't an actual emergency, consider the pros and cons of dealing with it now versus later. If it can be scheduled for later, then you have the luxury of staying on track with whatever you're immersed in.

For example, if you had set aside an hour to make 10 phone calls, don't sacrifice this priority to accommodate others unless it's really necessary to do so. If you allow interruptions to dictate your schedule, you'll be guaranteed to be in an unproductive stop and start mode all day. At the same time, though, you have to exercise good judgement so that you don't alienate your team or patients. There will always be times when you'll have to re-prioritize your tasks.

Setting "power" hours is a highly effective way of controlling interruptions. This is blocked time when you work, work, work without being disturbed. This principle, particularly when applied to the front desk, can deliver more productivity in an hour than is often achieved in a day plagued by stops and starts. Not only that, power hours energize people by freeing them to make headway – using the proven "do it now and do it right" principle – with their to do lists.

## Summary

So far, we've only scratched the surface of time management issues, by exposing some of the most common time wasters in the dental office and how they can be tackled. Next month, I'll delve into the specifics of personal organization, budgeting your time and trouble-shooting the time management saboteurs.



# CDA Convention – Calgary 1992 • August 29 - September 2

## CONVENTION UPDATE

### A Spouse / Guest Program to Remember!



1992 CDA  
Convention  
Spouses'  
Program  
Committee.  
(left to right)  
Cathy Kopec,  
Lynne Kearns  
and Judy  
Taillon

A hearty welcome to all Spouses and Guests from the organizing team of the Spouses' Program. Needless to say, the same Western enthusiasm that has touched all aspects of this Convention has carried over into bringing about a program chock full of fun, prizes, gifts, entertainment and education.

Each day starts off with a Chuckwagon Breakfast accompanied by toe-tapping western music at the Calgary Stampede and Exhibition Grounds. It is also here that we meet our first speaker, Sharon Wood, the first woman in the western hemisphere to reach the summit of Mount Everest, an astounding accomplishment. Those who have had the privilege of hearing Sharon speak say she weaves a kind of magic, captivating her audiences and holding them spellbound. Her compelling true story about beating the odds parallels the struggles of most striving individuals and organizations in everyday life. Following Sharon's fascinating address we will move over to the rustic Rotary House where we will enjoy wine, hors d'oeuvres and music by Harpist Debra Nyack. In this relaxing, western atmosphere you will have the opportunity to meet with Calgary's prominent artists and artisans who will display their works and creations especially for you.

On Tuesday morning we will have the opportunity to listen to Helen Vanderburg, a world champion synchronized swimming star who was Canadian female athlete of the year in 1977, 1978 and 1979 and is a member of the Canadian and World Sports Hall of Fame. Helen is currently a fitness professional and dynamic speaker who encourages the development of her audiences' own success skills, leading to improved attitudes, increased energy levels and the accompanying benefits.

You are in for a treat on Tuesday afternoon as we board a bus and head out to Spruce Meadows. Upon arrival, we will tour this world-class equestrian centre as final preparations are being made to host the renowned Spruce Meadows Masters. The Masters features a prestigious grand prix that offers the largest prize money of any show jumping event in the world.

We will lunch in the Garden Court Restaurant overlooking the All Canada Ring where former World Cup Champion and long time Canadian Equestrian and Olympic Team member Ian Miller and many other world class riders regularly compete.

Brenda Finley will be our luncheon speaker. Brenda is an accomplished actress as well as News Producer and Anchor of 10 Newsfirst in Calgary. Her experiences as a Newscaster and Foreign Documentary Correspondent in Kuwait, Iraq and Israel provide the material for fascinating tales. Musical entertainment in the Garden Court will be provided by the Flute & Guitar duo Flute Plus as well as the popular a cappella group Eddie and the Earthtones.

We know you will find it enjoyable and rewarding to participate in our full and vital program. So hurry and join up in order to be part of the best CDA Convention ever!

*Lynne Kearns, Cathy Kopec and Judy Taillon*

## WIN A JEEP!

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All you have to do is pre-register for the 1992 CDA Convention and you will receive your draw tickets by mail with your delegate package.

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## CDA Convention • Calgary 1992

# PRE-CONVENTION

## SATURDAY, AUGUST 29

|                                                                                                                    |                                                                                             |                                                                  |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <b>Jennifer de St. Georges</b><br>Key Time Management Problems (a.m.)<br>Taking the Risk out of Risk Taking (p.m.) | <b>Jay R. Friedman</b><br><b>Gary O'Brien</b><br>Surgical and Prosthetic Implants – Lecture | <b>Howard Martin</b><br>High Tech Root Canal – Flare, File, Fill |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------|

**SUNDAY, AUGUST 30**

|                                                                                                                        |                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Terry Donovan</b><br/>         Esthetic Restorative<br/>         Dentistry and Materials<br/>         Update</p> | <p><b>Jay R. Friedman</b><br/> <b>Gary O'Brien</b><br/>         Surgical and<br/>         Prosthetic Implants –<br/>         Hands-on</p> |
|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|

MONDAY, AUGUST 31

|                                                                                        |                                                                                             |                                                                                         |                                                                              |                                                                                            |                                                                                                                                                                                                                                                                               |                                                                       |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <p>8:00<br/>to<br/>10:00</p> <p>10:30<br/>to<br/>12:30</p> <p>2:00<br/>to<br/>4:00</p> | <p><b>Robert Boyd</b><br/>Post-Orthodontic Occlusion<br/><b>GRIEVE MEMORIAL LECTURE</b></p> | <p><b>Roy Page</b><br/>Prevalence, Progression and Etiology of Periodontal Diseases</p> | <p><b>Lauralynn Mealing</b><br/>Home Computers: Opening Windows</p>          | <p><b>Donald Yu</b><br/>How to Feel, Fill, Thrill Accessory Canals</p>                     | <p><b>University of Alberta</b><br/><b>Charles Baker</b><br/>Radiographic Techniques Assisting Implant Utilization<br/><b>Sharon Compton</b><br/>"Plaque-Free" Implant Fixture<br/><b>Christopher Robinson &amp; Keith Compton</b><br/>Complications with Dental Implants</p> | <p><b>E<br/>X<br/>H<br/>I<br/>B<br/>I<br/>T<br/>I<br/>O<br/>N</b></p> |
|                                                                                        | <p><b>Ken Neuman</b><br/>Cosmetic Imaging – The Ultimate Communication Tool</p>             | <p><b>Roy Page</b><br/>Differential Diagnosis of Periodontal Diseases</p>               | <p><b>Sharon Wood</b><br/>Mountains of Challenge<br/><b>CFDE Lecture</b></p> | <p><b>Claude Lamarche</b><br/>Les clés du succès en prothèse complète (French program)</p> | <p><b>Nathan S. Birnbaum</b><br/>Bonded Restorations for Posterior Teeth</p>                                                                                                                                                                                                  |                                                                       |
|                                                                                        | <p><b>H. Jack Stockton</b><br/>Dental Practice Economics</p>                                | <p><b>Alan R. Milnes</b><br/>Managing Children's Behaviour in the Dental Office</p>     | <p><b>Roy Page</b><br/>Differential Diagnosis of Periodontal Diseases</p>    | <p><b>John Molinari</b><br/>Hepatitis B and AIDS Challenges to Infection Control</p>       | <p><b>TABLE CLINICS</b></p>                                                                                                                                                                                                                                                   |                                                                       |

**TUESDAY, SEPTEMBER 1ST**

|                      |                                                                        |                                                               |                                                               |                                                                                                     |                                                                                |                                                                |
|----------------------|------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------|
| 8:00<br>to<br>10:00  | <b>Ronald E. Jordan</b><br>Anterior Composite<br>Materials – An Update | <b>Anita Jupp</b><br>Practice Management<br>for the 90's      | <b>John McDougall</b><br>Nutrition for the<br>Dental Patient  | <b>Claude Lamarche</b><br>Prothèse partielle amovible :<br>conditions actuelles<br>(French Program) | <b>Helen Vanderburg</b><br>Building a Lifestyle<br>for Success                 | <b>E<br/>X<br/>H<br/>I<br/>B<br/>I<br/>T<br/>I<br/>O<br/>N</b> |
| 10:30<br>to<br>12:30 | <b>Ronald E. Jordan</b><br>Dentin Bonding Agents –<br>An Update        | <b>Joel White</b><br>Research and Lasers:<br>Clinical Effects | <b>Mary Krywulak</b><br>Pediatric Oncology<br>Patient         | <b>John Molinari</b><br>Infection Control in a<br>Changing World                                    | <b>Edward Kisling</b><br>Collecting Accounts<br>Receivable                     |                                                                |
| 2:00<br>to<br>4:00   | <b>Harold Goodis</b><br>Lasers in Endodontics                          | <b>Steven Lewis</b><br>Esthetics and<br>Osseointegration      | <b>Annette Linder</b><br>Redefining the<br>Recall Appointment | <b>John McDougall</b><br>Nutrition in the Cause and<br>Treatment of Disease                         | <b>Vanik Jinoian</b><br>The In-Ceram, All Porcelain<br>Crown and Bridge System |                                                                |

WEDNESDAY, SEPTEMBER 2ND

|                     |                                                            |                               |                               |                               |
|---------------------|------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 8:00<br>to<br>10:00 | <b>Annette Linder</b><br>Hygiene Department<br>Development | <b><i>MORE TO FOLLOW!</i></b> | <b><i>MORE TO FOLLOW!</i></b> | <b><i>MORE TO FOLLOW!</i></b> |
|---------------------|------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|



## Calgary 1992

### Limited attendance Pre-convention Courses



Saturday, August 29

**Jennifer de St. Georges**  
Monte Sereno, California

#### A.M. "Handling Key Time Management Problems"

Time management is the key to a successful practice. Subjects to be covered:

- Scheduling problems
- Nine golden rules for handling office emergencies
- 24 benefits of a five-minute morning meeting

#### P.M. "Taking the Risk out of Risk Taking"

The lecturer will present participants with a prescription for tomorrow's practice.

- Giving patients quality of care
- Moving the dental practice to the next level of management



Saturday, August 29

**Howard Martin, D.M.D.**  
Silver Spring, Maryland

#### "High Tech Root Canal – Flare, File, Fill"

Hands-on – Limited Attendance  
Sponsored by CAULK CANADA

This course will increase your clinical experience in technological advances to do more endodontics with ease, effectiveness and efficiency.

- Caviendo ultrasonic endodontics
- Endotec & warm lateral condensation
- Control Safe end K/H file & handle
- M series automated canal orifice opener
- 2 in 1 endo access bur for penetration and opening
- Curved canal management
- One appointment endodontics



Saturday, August 29  
Sunday, August 30

**Jay R. Friedman, D.D.S.**  
Los Angeles, California

**Gary R. O'Brien, D.D.S.**  
Los Angeles, California

#### "Surgical and Prosthetic Implants"

Hands-on – Limited Attendance  
Sponsored by DENTSPLY/CORE-VENT

On the first day, the course will concentrate on the current knowledge and information relating to the surgical placement of cylindrical endosseous fixtures. Restorative implant dentistry through the use of different components will be reviewed. Evaluation and treatment planning procedures for single tooth, partially edentulous and completely edentulous patients will be discussed. Fabrication of stents will be shown. The methods of connection between natural teeth and implants, if needed, will be reviewed.

The second day of this course will feature surgical and prosthetic hands-on training.



Sunday, August 30

**Terry Donovan, D.D.S.**  
Los Angeles, California

#### "Esthetic Restorative Dentistry and Materials Update"

Topics to be covered include:

- Essentials for soft tissue esthetics on fixed prosthodontics;
- Effective gingival displacement;
- New materials and techniques for fabrication of provisionals;
- Review of impression materials;
- New impression techniques;
- Solutions for fractured porcelain: metal bonding - mystery & myth;
- Current thoughts on bonding to tooth structure;
- Conservative esthetic techniques: bleaching, enamel microabrasion;
- Bonded porcelain: veneers, inlays/onlays, use in oral rehabilitation;
- Other current topics.



# CDA Convention • Calgary 1992

## PRELIMINARY PROGRAM

MONDAY, AUGUST 31ST



**ROBERT BOYD, D.D.S., M.Ed.**

*San Francisco, California*

**"Surgical, Restorative and Splinting Procedures for Stability in the Post-Orthodontic Occlusion"**

**GRIEVE MEMORIAL LECTURE**



**ROY PAGE, D.D.S., Ph.D.**

*Seattle, Washington*

**"Prevalence, Progression and Etiology of Periodontal Disease"**



**LAURALYNN MEALING**

*Burnaby, British Columbia*

**"Opening Windows"**



**DONALD YU, B.S., D.M.D., M.Sc.D.**

*Edmonton, Alberta*

**"Micro Tissues, Micro Issues: How to Feel, Fill, Thrill Accessory Canals"**

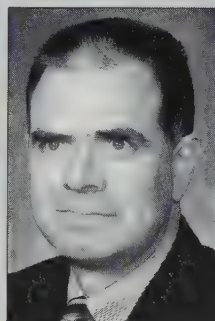


**KEN NEUMAN, D.M.D.**

*Vancouver, British Columbia*

**"Cosmetic Imaging – The Ultimate Communication Tool"**

### 75<sup>TH</sup> ANNIVERSARY OF THE FACULTY OF DENTISTRY AT THE UNIVERSITY OF ALBERTA



**CHARLES BAKER, D.D.S., M.Sc.**

*University of Alberta, Edmonton, Alberta*

**"Contemporary Radiographic Techniques Assisting in Effective Implant Utilization"**



**SHARON COMPTON, R.D.H., B.S., M.A. (Ed.)**

*University of Alberta, Edmonton, Alberta*

**"The Challenge and Importance of "Plaque-Free" Implant Fixtures"**



**KEITH COMPTON, B.Sc., D.D.S., M.S.**

*University of Alberta; Edmonton, Alberta*

**"Complications with Dental Implants – "This Could Never Happen to Me..."**



**CHRISTOPHER ROBINSON, D.D.S.**

*University of Alberta; Edmonton, Alberta*

**ROY PAGE, D.D.S., Ph.D.**

*Seattle, Washington*

**"New Approaches to the Diagnosis and Treatment of Periodontal Diseases"**



# CDA Convention • Calgary 1992

## PRELIMINARY PROGRAM

MONDAY, AUGUST 31ST



**ROY PAGE, D.D.S., Ph.D.**  
*Seattle, Washington*

**"Differential Diagnosis of Periodontal Diseases"**



**SHARON WOOD**  
*Canmore, Alberta*

**"Mountains of Challenge"**  
**CFDE LECTURE**



**CLAUDE LAMARCHE, D.D.S.**  
*Montreal, Québec*

**« Les clés du succès en prothèse complète »**  
(Lecture given in French)



**H. JACK STOCKTON,**  
**D.M.D., C.F.P., M.B.A.**  
*Winnipeg, Manitoba*

**"Dental Practice Economics – Effective Financial Analysis and Planning"**



**ALAN R. MILNES,**  
**D.D.S., Dip.Paed., Ph.D.**  
*Toronto, Ontario*

**"Managing Children's Behaviour in the Dental Office"**



**JOHN MOLINARI, Ph.D.**  
*Detroit, Michigan*

**"Hepatitis B and AIDS: Challenges to Infection Control"**

**NATHAN S. BIRNBAUM,**  
**D.D.S., C.A.G.S.**  
*Boston, Massachusetts*

**"Bonded Restorations for Posterior Teeth – A Comparison of Currently Available Systems"**

*Sponsored by Coltene/Whaledent*

### Table Clinics

Table Clinics are defined as a brief table top presentation or demonstration of five to ten minutes duration using visual aids, and repeated over a two hour period.

Those interested in presenting, write to:

**TABLE CLINICS**  
CDA Conventions  
1815 Alta Vista Drive  
Ottawa, Ontario K1G 3Y6



# CDA Convention • Calgary 1992

## PRELIMINARY PROGRAM

TUESDAY, SEPTEMBER 1ST



**RONALD E. JORDAN, D.D.S., M.S.D.**  
*Winnipeg, Manitoba*  
**"Anterior Composite Materials: An Update"**



**JOEL WHITE, D.D.S.**  
*San Francisco, California*  
**"Research and Lasers: Clinical Effects"**  
*Sponsored by American Dental Laser*



**ANITA JUPP**  
*Burlington, Ontario*  
**"New Horizons for the Accelerated Practice of the 90's"**



**ANNETTE LINDER, R.H.D., B.S.**  
*Richmond, Virginia*  
**"Recall Redefined: Design for Clinical and Practice Success"**



**JOHN McDOUGALL, M.D.**  
*Santa Rosa, California*  
**"Nutrition for the Dental Patient"**



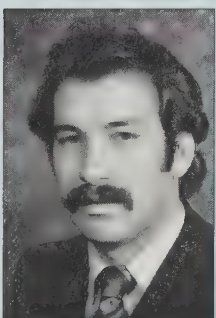
**MARY KRYWULAK, D.D.S., M.S.**  
*Ottawa, Ontario*  
**"Oral Manifestations of the Pediatric Oncology Patient"**



**CLAUDE LAMARCHE, D.D.S.**  
*Montreal, Québec*  
**« Prothèse partielle amovible : conditions actuelles »**  
(Lecture given in French)



**JOHN MOLINARI, Ph.D.**  
*Detroit, Michigan*  
**"Infection Control in a Changing World"**



**VANIK JINOIAN, M.D.T.**  
*Bad Sackingen, West Germany*  
**The In-Ceram, All Porcelain Crown and Bridge System**  
*Sponsored by Degussa Canada Ltd.*



# CDA Convention • Calgary 1992

## PRELIMINARY PROGRAM

**TUESDAY, SEPTEMBER 1ST**



**EDWARD KISLING**

*Vancouver, British Columbia*

**"How to Collect Accounts  
Receivable and Still Retain the  
Patient As a Patient"**

*Sponsored by Direct Dental Funding*



**RONALD E. JORDAN,  
D.D.S., M.S.D.**

*Winnipeg, Manitoba*

**"Dentin Bonding Agents:  
An Update"**



**HAROLD GOODIS, D.D.S.**

*San Francisco, California*

**"Lasers in Endodontics"**

*Sponsored by American Dental Laser*



**STEVEN LEWIS, D.D.S.**

*Los Angeles, California*

**"Esthetics and Osseointegration"**

*Sponsored by Nobelpharma Canada Inc.*



**JOHN McDOUGALL, M.D.**

*Santa Rosa, California*

**"Nutrition in the Cause and Treat-  
ment of Disease"**

**WEDNESDAY, SEPTEMBER 2ND**



**ANNETTE LINDER, R.H.D., B.S.**

*Richmond, Virginia*

**"Hygiene Department Development"**

**WESTERN  
HOSPITALITY  
ALL THE WAY !**

**...WHAT A WAY  
TO START  
THE DAY !**

**A Chuckwagon Breakfast  
will be offered to all CDA delegates  
on Monday and Tuesday  
by Aurum Ceramics / Classic.**





# Calgary 1992



## Spouses' Program

The sheer variety of this program will convince you to register today!

### MONDAY, AUGUST 31, 1992

- |               |                                                                                                                                                                                                                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:00         | Breakfast                                                                                                                                                                                                                                                                   |
| 10:30 - 12:30 | Sharon Wood, the first North American woman to reach the summit of Mount Everest in 1986, will present a compelling true story about beating the odds in "Mountains of Challenge".                                                                                          |
| 12:30 - 16:00 | Rotary House - Stampede Grounds: Hors d'oeuvres and wine will be served against a background of music played by Harpist Debra Nyack. Later, we will bring the shopping to you! Local artists and artisans will display their dazzling creations for your shopping pleasure. |

### TUESDAY, SEPTEMBER 1, 1992

- |               |                                                                                                                                                                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:00 - 08:00 | Breakfast                                                                                                                                                                                                                                                                            |
| 08:00 - 10:00 | Helen Vanderburg, world swimming champion and a fitness professional, member of the Canadian and International Sports Hall of Fame, will present "Building a Lifestyle for Success". The topics will include: characteristics of high performers, attitude, energy and goal-setting. |
| 10:00 - 12:00 | Transfer by bus to Spruce Meadows and tour this world-class equestrian centre                                                                                                                                                                                                        |
| 12:30 - 12:50 | Presentation by Brenda Finley, co-producer and host of Calgary Television's daily news program, the second most watched late night local news program in the country.                                                                                                                |
| 12:50 - 14:00 | Lunch accompanied by the flute and guitar duo "Flute Plus"                                                                                                                                                                                                                           |
| 14:00 - 14:30 | Entertainment by Eddie and the Earthtones                                                                                                                                                                                                                                            |
| 15:00 - 15:30 | Depart Spruce Meadows for Calgary                                                                                                                                                                                                                                                    |

## Programs for Tots, Children and Teens

### Different Activities for each Age Group!

#### TOTS' PROGRAM (ages 2-4)

##### Monday, August 31st and Tuesday, September 1st

A drop-off centre at the downtown YM-YWCA has been reserved for your convenience. While you are enjoying the spouses program and doing some shopping in Calgary, your tots will be playing games and having great fun, under the professional supervision of YWCA day-care providers.

#### CHILDREN'S PROGRAM (ages 5-12)

##### Monday, August 31st

- |               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| 07:45 - 08:15 | Pick up at Convention Hotels (parents must sign in their children)                      |
| 08:30         | The Morning Show                                                                        |
| 09:00         | Swimming at the YWCA                                                                    |
| 10:30         | Visit to the Calgary Energium                                                           |
| Noon          | Lunch at the top of the Calgary Tower                                                   |
| 13:30         | Rollerskating (Lloyd's Rollercoade)                                                     |
| 16:00 - 17:30 | Return to YWCA and drop off at Convention Hotels (parents must sign out their children) |

##### Tuesday, September 1st

- |               |                                                                                                             |
|---------------|-------------------------------------------------------------------------------------------------------------|
| 07:45 - 08:15 | Pick up at Convention Hotels (parents must sign in their children)                                          |
| 08:30         | The Morning Show                                                                                            |
| 09:00         | Bus pick up for Calaway Park                                                                                |
| 09:30         | Visit the Flintstones in Calgary's Bedrock theme park. Rides, live shows, and many more attractions. Snack. |
|               | BBQ LUNCH                                                                                                   |
| 16:00 - 17:30 | Return to YWCA and drop off at Convention Hotels (parents must sign out their children)                     |

#### TEENS' PROGRAM (ages 13-16)

##### Monday, August 31st and Tuesday, September 1st

The Alpine Club of Canada offers overnight mountain adventure for your fun-seeking, active teens! Teens will be bussed from Calgary to Lake O'Hara and Roger's Pass where they will experience the beauty of the great Alberta outdoors, accompanied by professional guides. Registration fees include food, accommodations, transportation, guides and chaperones.





## CDA Convention • Calgary 1992

### SOCIAL PROGRAM

*CDA Conventions and Ash Temple/Servident present:*

#### THE 1992 OPENING CEREMONY

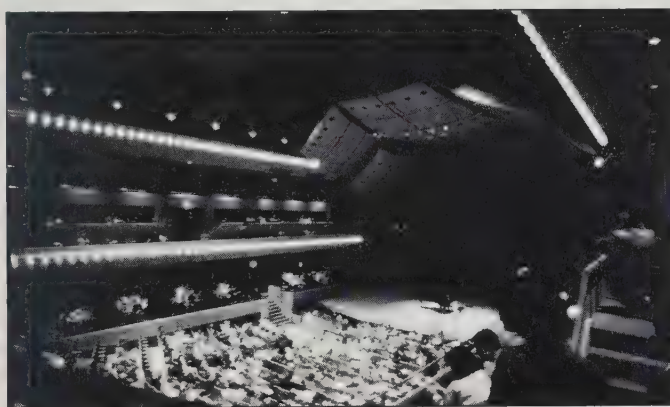
SUNDAY, AUGUST 30 • 5:00 - 7:00 p.m.

This colourful and animated event will be held at Calgary's elegant Centre for Performing Arts.

The star-studded variety show will feature the Young Canadians, an energetic group of singers and dancers who have earned top billing at the Stampede's Grandstand Show – and an international reputation as first-class entertainers.

Sharing the spotlight with the Young Canadians is country vocalist Cindy Church and her band, the Rhythm Rangers. A native of Alberta, this performer is becoming known nationwide for her unique vocal stylings.

And there's more! Space is limited, so register today!



MONDAY, AUGUST 31

6:00 p.m. - 1:30 a.m.

#### STAMPEDE RODEO NIGHT

*organized exclusively for CDA delegates!*



This evening is designed to give you a front-row seat for the rough and rowdy events that made the Stampede famous. You'll experience the thrill of watching the world's finest cowboys battle against the meanest, toughest outlaw stock. You'll see it all – from calf roping to bull riding to steer wrestling – and you'll discover why the Stampede has been branded "The Greatest Outdoor Show on Earth."

When the wild-west rodeo is over, a honkey-tonk dance will be in full swing and you'll be able to join the lively two-step dance company ... for a little fancy footwork.

TUESDAY, SEPTEMBER 1

7:00 p.m. - 1:00 a.m.

#### WESTERN FORMAL GALA

The cherished President's Gala Dinner and Dance ... is going Western!

The dress is "black-tie cowboy" which means you can combine your tux jacket with a bolo tie, silk shirt, blue jeans ... and of course, your cowboy hats and boots. The same goes for ladies.

The evening will offer you plenty of opportunity to swing your partner to the Big Band sounds of the Eric Friedenberg Orchestra, and the music of the 50's, 60's and 70's, performed by the Fun Company.





## CDA Convention • Calgary 1992

**NEW THIS YEAR!**

### **GOLF THE KANANASKIS ... AT THE "C.D.A. GOLF CLASSIC"**

**Sponsored by Aurum Ceramic/Classic**

**FRIDAY, AUGUST 28, 1992**

Enjoy the spectacular beauty of the Kananaskis Golf & Country Club!

The registration fee covers green fees, power cart and steak barbeque. In addition, all registered golfers will receive a registration package including an AM/FM stereo cassette, golf hat, golf balls, tees and ball markers!

Dentists participating in the C.D.A. Golf Classic will have the opportunity to win a "Golf Getaway in Palm Desert". The draw will be made at the convention.

To register, see the REGISTRATION FORM on following pages.  
Attendance is limited!



**Kananaskis Country is  
a glorious marriage  
of nature's extremes.**

To the east, the land is a combination of cool, grassy plains and gently rolling foothills with patches of lodgepole pine and aspen. Deeper into the western heart of Kananaskis Country, the foothills rise into mountains, and the clusters of aspen into vast forests of blue-tinged spruce, larch and whitebark pine. Alpine meadows display their patchwork carpets of wild flowers.



### **ANNUAL FUN RUN**

**MONDAY, AUGUST 31**

**Run starts at 4:30 p.m.**

**Be a tourist ... on the run!**



This Fun Run will allow you to acquaint yourselves with the downtown section of the top rated pathway system in Calgary!

The course follows the tree-lined banks of the Bow River offering an excellent running surface free from vehicular traffic ... a jogger's paradise.

No official time will be kept ... so you can run just for the fun of it!

All participants will receive a T-shirt and will qualify for prizes that will be drawn at completion of the run.

**REGISTER TODAY!**



# CDA Convention • Calgary 1992

## MURRAY McDONALD MEMORIAL LECTURE

MONDAY, AUGUST 31 • 10:30 a.m. - 12:30 p.m.

On May 20, 1986, at 9:00 p.m., Sharon Wood and fellow team member Dwayne Congdon set foot on top of Mount Everest, the highest mountain on earth at 29,028 feet.



**SHARON WOOD**  
"Mountains Of Challenge"

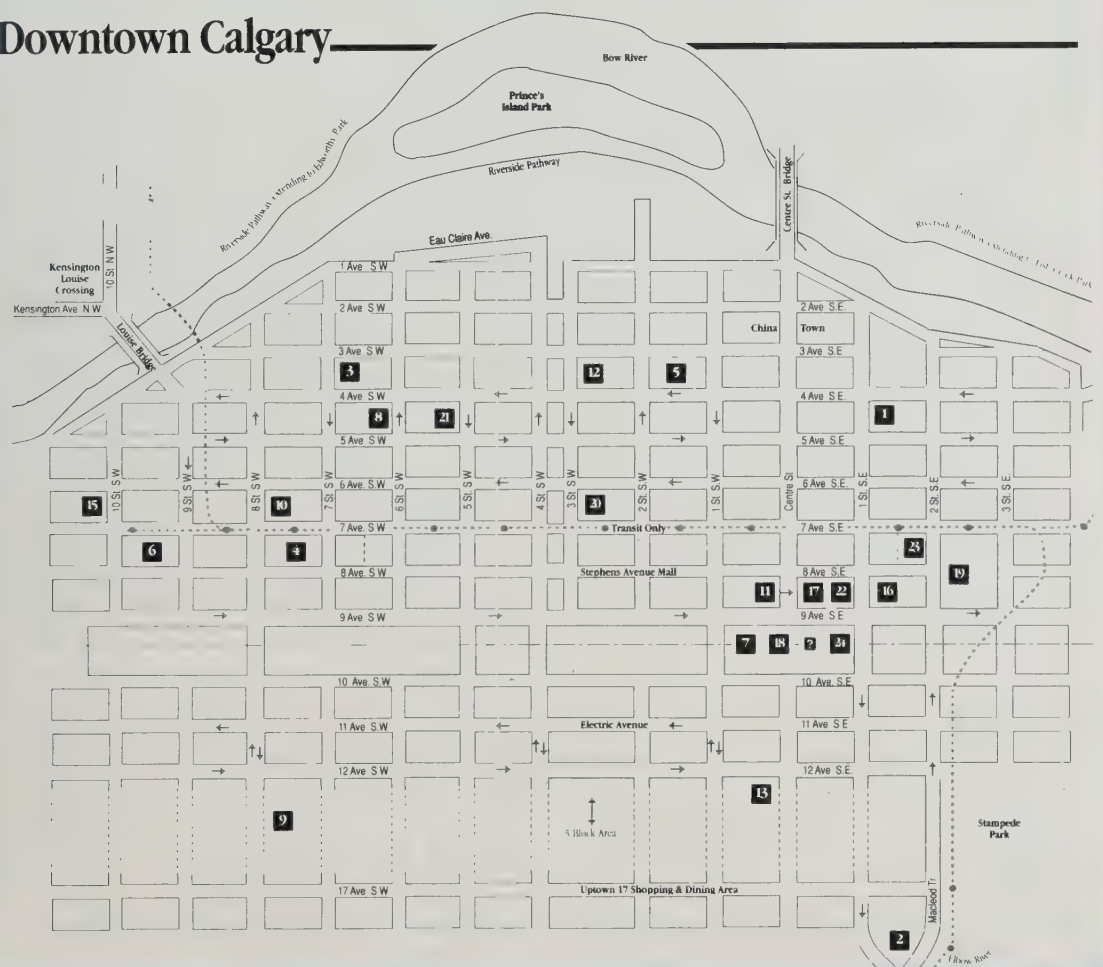
The 1992 edition of the Murray McDonald Memorial Lecture sponsored by the Canadian Fund for Dental Education (CFDE) will feature an address by Ms. Sharon Wood, the first North American woman to climb Mount Everest in 1986.

Sharon Wood's fascination with rock climbing began when she was 16 years old. The combined challenge of physical and mental gymnastics this activity demanded precipitated a monumental change in her life: the discovery of challenge. Simple concepts such as commitment, focus and struggle took on new meanings.

In 1977, she climbed the highest mountain in Canada, Mount Logan, and subsequently went on to climb several mountains throughout the world over 20,000 feet. Her interest in working as a team player grew as she experienced the dynamics generated by a group of individuals sharing the same vision.

Sharon Wood's presentation is a compelling true story about beating the odds.

## Downtown Calgary



## LEGEND

1. Delta Bow Valley Inn
5. The International Hotel
7. The Palliser (CP Hotel)
11. The Skyline Plaza Hotel
12. The Westin Hotel
15. Alberta Science Centre and Centennial Planetarium
16. Calgary Centre for Performing Arts
17. Calgary Convention Centre
18. Calgary Tower
19. City Hall
20. Devonian Gardens at Toronto Dominion Square
21. Energeum
22. Glenbow Museum
23. Olympic Plaza
24. Train Station
- ☆ Calgary Stampede & Exhibition Ground



# 1992 CANADIAN DENTAL ASSOCIATION ANNUAL CONVENTION

August 29 - September 2, 1992 • Calgary

## Hotel Reservation Form

Please check appropriate category:

☐ Dentist ☐ Hygienist ☐ Assistant ☐ Office Personnel ☐ Exhibitor (Company name: \_\_\_\_\_)

☐ Other (please specify) \_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ Province: \_\_\_\_\_ Postal Code: \_\_\_\_\_

Telephone: ( ) \_\_\_\_\_ ( ) \_\_\_\_\_  
(Residence) (Office)

Type of Room:

☐ Single ☐ Double ☐ Twin ☐ Other (please specify) \_\_\_\_\_

Special Requests: \_\_\_\_\_

Indicate your hotel choice\* (by numbering the boxes):

- ☐ Skyline Plaza Hotel (CDA Headquarters) ..... \$ 105.00 single / double  
☐ The Palliser (CDA Headquarters) ..... \$ 110.00 single / double  
☐ The International ..... \$ 100.00 single / double  
☐ Delta Bow Valley ..... \$ 115.00 single / double  
☐ The Westin Hotel ..... \$ 125.00 single / double

\* Prices do not include GST or PST (5% PST in Alberta)

Arrival Date: \_\_\_\_\_ Arrival Time: \_\_\_\_\_ Departure Date: \_\_\_\_\_

All changes and/or cancellations must be made through CDA Conventions (613) 523-1770.

In order to reserve a room, a guarantee for the first night is essential. The guarantee will apply to the first night ONLY.  
To cancel your reservation advise the CDA at least three (3) days prior to your arrival.

☐ MasterCard ☐ American Express ☐ VISA Card Number: \_\_\_\_\_ Expiry Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Send Reservation Form to: CDA Conventions, Canadian Dental Association,  
1815 Alta Vista Drive, Ottawa, Ontario K1G 3Y6

DEADLINE for Reservations: July 10, 1992

### Making your Airline Reservations



Air Canada has been appointed the sole official carrier for the Canadian Dental Association 1992 Annual Convention in Calgary. Special arrangements have been made with Air Canada to offer convention participants discounts on air fares. To take advantage of this service, you must call Air Canada's Convention Central when booking your tickets (your travel agent can call on your behalf). Dial 1-800-361-7585 and quoting Event No. CV920421, you can benefit from savings up to 65% on the regular Hospitality Class, with minimum guaranteed savings of 15% on the full Hospitality and Executive Class services.

Not to be overlooked, Air Canada has graciously offered two economy class return tickets good for travel on any Air Canada serviced destination (except Bombay and Singapore). This will be the prize awarded in our Advance Registration Draw. To be eligible for the draw, dentists and dental team members must register for the convention before July 10, 1992.







# The Dawn of a New Era in Patient Education



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October 1991 marked the dawn of a new era in patient education. The signal event? The launch of CDA's Dental Information System.

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Nineties. It's what dentists told us they needed. What patients told us they wanted. It is dental information redefined: the way it looks, the way it's organized, the way it's read, the way it works.

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- wide range of topics
- easy access indexing system
- boxes, charts and photography that make information lively
- custom designed plexiglass rack (24" X 24" square)



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1-800-267-6364 (Eastern Canada)

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# Book Reviews

## Cross Infection Control in Dentistry: A Practical Illustrated Guide

by Peter R. Wood

1992, Mosby Year Book Inc., St. Louis  
207 pages, \$49.95 U.S.

This hard-cover, 200-page book could be described as a "Show and Tell" manual of infection control, although, given the author's lean approach to writing, the text concentrates much more on the "Show" aspect than the "Tell." Still, Peter Wood must be complimented for attempting to distil, into a palatable concoction, the myriad of policies and procedures surrounding the prevention of disease transmission in dentistry.

Considerable emphasis is given to the infection-control policies promulgated by the U.S. Occupational Safety and Health Administration (OSHA) and equivalent organizations in the United Kingdom. In fact, the book outlines the current infection-control recommendations of 15 countries (Canada being a notable exception). This information has been compressed into 18 chapters, each of which has a similar format. The text, while brief, is enhanced by a liberal use of figures, tables, illustrations and comprehensive reference lists.

Unfortunately, the book's design is somewhat unusual. The text occupies two columns per page, with single paragraphs running in both columns. Rather than reading the entire left column followed by the right, the reader must jump from column to column while moving down each page, which can be confusing. In addition, the numerous color photographs have a peculiar "washed out" appearance, and many of the illustrations are of doubtful value. Is it really necessary, for instance, to show rubber dam in position, or an example of a polishing lathe? Probably not. And it is certainly redundant to have two photographs of eye washing, and of no educational purpose to include a black and white photograph of the ADA Infection Control Package. These unexpected flaws mar what is otherwise a high-quality publication.

Also of note, the author incorrectly attributes the Centers for Disease Control (CDC) in Atlanta for the designation of instruments as critical, semi-critical and non-critical. This concept was actually devised by E.H. Spaulding in 1968.

No doubt, publication deadlines prevented the inclusion of current recommendations with regard to hepatitis B vaccination "booster" doses, which are now considered to be unnecessary, or of CDC's decision to withdraw its suggestion that HIV-positive individuals avoid performing invasive procedures.

In his introduction, the author identifies two reasons to justify current concerns pertaining to infection control. First, he notes that OSHA, a United States federal bureaucracy, enforces strict policies, and implies that such policies must therefore be correct and scientifically valid. Perhaps Mr. Wood does not believe that government agencies tend to become self-fulfilling entities whose success is judged by the budget size, number of personnel and frequency of pronouncements rather than by cost-effective analysis. For example, the effectiveness of universal precautions has not been established and there is no evidence of disease transmission from dental equipment. Furthermore, the historical incidence of hepatitis B spread in dentistry has been exaggerated and is now – because of the effectiveness of the vaccination against the virus – a non-issue.

As a second justification, the author refers to the alleged transmission of HIV from Dr. David Acer to patients during dental treatment, and seems to take it for granted that the route of infection between the Florida dentist and these individuals has been established. In fact, CDC have always stated that such a route was only a possibility. To date, CDC has been unable to prove a dental route of transmission, and their interpretation of the DNA analysis has been questioned.

In summary, the text is often a repetition of current dogma. This politically-correct approach to infection control will no doubt continue until there is enough historical and epidemiological evidence available to prove that it is inappropriate relative to the risks involved. In the meantime, extraordinary, intensive measures will continue to be advocated against an infinitesimally small number of exposure risks.

Despite all its faults, the book does provide a practical demonstration of current OSHA guidelines (although such information is readily available elsewhere) and its compact nature may appeal to some readers.

Has the author achieved his goal? Perhaps. The book is a convenient re-

source for relatively current recommendations. Is it a valuable contribution to dental science? History will be the judge.

Reviewed by:

J. Hardie, BDS, M.Sc., FRCDC  
Head, Department of Dentistry,  
Vancouver General Hospital

## Maritime Dental College and Dalhousie Faculty of Dentistry – A History

by Oskar Sykora

1991, Dalhousie University Faculty of Dentistry and the Nova Scotia Dental Association, Halifax, Nova Scotia, 279 pages, 70 B&W illustrations, \$45.

This hard cover book traces, in detail, the history of dental education in Atlantic Canada. It explores the state of dentistry prior to the establishment of the Maritime Dental School in 1908, and describes the struggles, successes, failures and triumphs that occurred in dental education over the next 83 years, to 1991.

The author carefully outlines the close alliance that has bound the Nova Scotia Dental Association and the province's dental educators together for more than 100 years. This alliance is seen as a natural progression: a legal body that determined the requirements to practice came first, followed by a mechanism for examination and then, to maintain standards, a school of higher learning.

Interestingly, the original Maritime Dental College was founded, owned and operated by the Nova Scotia Dental Association from 1908 to 1912. When it became the Dalhousie University dental faculty in 1912, the college was not only the first fully-integrated university dental faculty in Canada, it was also debt free.

Despite its location in Halifax, the dental faculty did not remain a specifically Nova Scotian centre of learning. The author describes how hundreds of the dentists and dental hygienists who came to Dalhousie to learn their professions subsequently went on to influence dentistry's future throughout the Atlantic region. And as the faculty developed post-graduate and research programs, its influence spread into the rest of Canada and beyond.

The book's 11 chapters progress in an orderly fashion, telling interesting stories about every facet of a dental faculty. It seems that no department or



person is left out. Naturally, considerable emphasis is given to the eight deans who played a leadership role in the faculty, but a full chapter is devoted to what the author calls "The Unsung Heroes," the faculty's students, patients and support staff – even the front desk security commissionaires.

The book has 70 black and white illustrations – many of them historic and all of them interesting – liberally distributed throughout the text. If there is a criticism, it would be the somewhat washed-out appearance of many of the photos. Reproducing old manuscripts and photos is difficult, but it is obvious that some of the contrast has been lost in many of the book's illustrations.

Each chapter is followed by numerous references – which occasionally extend over several pages – and the text is replete with quotations from dental association and university documents. Although these quotations give an air of authenticity to the text, they tend to be tedious to read. The book's appendices are also generous. They list not only every graduate, but also those who subsequently became dental association presidents in Atlantic Canada and/or of the Canadian Dental Association.

The book is a first in Canada. It is the most comprehensive history yet published on any of the country's 10 dental faculties, and should appeal to any reader interested in the history of dental education. And it is a must-read for every living dentist, dental hygienist and staff person who – as the author does in his closing sentence – have proudly proclaimed, "I am from Dalhousie dental school."

A political refugee from Czechoslovakia, Dr. Sykora came to Canada with his parents in 1948. Through sheer determination, he obtained his BA and MA while working as a dental technician. He received his PhD from the faculté des lettres of the University of Montreal and his DDS degree from McGill University, on the same day, in 1959.

Dr. Sykora spent several years with the department of removable and fixed prosthodontics at McGill University before relocating to Dalhousie University in 1972. He has refused to accept any payment for his book. Instead, any and all of the profits it generates will be used to establish a special student bursary fund.

*Reviewed by:*

*P. Ralph Crawford, BA, DMD*

*Editor, Journal of the Canadian Dental Association.*

## **Antibiotic/antimicrobial use in dental practice**

**by Michael Newman and Kenneth Kornman**

*1990, Quintessence Publishing Co., Inc., Chicago*

*260 pages, B & W illustrations, \$30 (U.S.)*

This new edition, which is meant to update dental practitioners on the use of antimicrobial agents, is based on the advances that have occurred both in overall knowledge and clinical experience over the last six years. It has been enhanced with the addition of new topics relevant to today's dental practice, including: a guide for use of topically applied agents; maintenance of implants and managing peri-implant infections; managing infections in patients wearing prostheses; new information on pre-medication of medically-compromised patients; and management of immunocompromised patients, including HIV-seropositive patients and immunosuppressed transplant patients.

The book, which is divided into 20 chapters, was written by 17 different authors. While it benefits from their broad range of experiences, it also tends to be redundant, at times, and of uneven quality.

Most books are valued either for the practical information they contain, or for their literary depth. This book falls into the practical guide category. Unfortunately, it is overly long, possibly because the chapters and sections are assigned to clinical disciplines, and each one repeats basic information about some of the same target microorganisms and the same antimicrobial agents. For example, candidiasis is discussed in several areas, and a few authors repeat the pharmacological and/or dosage information for common antibiotics, which is presented in chapter 5.

The book's most helpful features are its easy-to-read summary tables, the appendices, and the consistent use of bold print to emphasize the "take-home" message. The tables and appendices repeat much of the text in a condensed form. One risk entailed by using such a format is that it might offer dentists too much of a temptation to read the headlines and skip the explanatory passages.

The text often lacks strict editorial syntax, and it sometimes relies on jargon – it reads in places as though the author is giving a lecture to dental students instead of writing for a broader

audience. Some examples: chapter 5 categorizes individual drugs illogically as either "penicillins" or "nonpenicillins," and the nonpenicillins are listed alphabetically except for metronidazole, which is stuck at the end of the antibiotics. Chapter 4 claims that "without sensitivity test results, the dentist is left to play antibiotic roulette." A few misplaced words found later in the chapter imply that saliva samples should be taken with sharp dental instruments. Chapter 6 uses the jargon "3rd generation antiplaque agents," which are not defined until chapter 7, and then chapter 7 forgets to discuss them. There is only one "second generation" agent listed, chlorhexidine, which appears to be classified as such because of its substantivity. Chapter 7 also lists "rampant caries" under mucosal infections.

Both the generic and U.S. trade names of agents are used in the text, which can be confusing for dentists in Canada and other countries. And, as is the case in many books that are already a bit out of date by the time they are published, this one has a few inaccuracies that are no fault of the authors. The prophylactic antibiotic regimen table in chapter 17 has now been superseded, for example. However, in all fairness to the authors, the text does hint at impending changes.

The nomenclature for some of the anaerobic species discussed in chapter 2 has also changed recently, but a new edition per month would be required to keep pace.

A noteworthy feature of this book is the direct attention paid to special patients and special situations: immunocompromised patients, female patients, allergies and adverse reactions, implant complications, pediatric considerations, and legal considerations. Few other books aimed at the dental market have been so considerate. And by supplementing the chapters on odontogenic infections, maxillofacial infections, periodontal infections, caries, and mucosal infections, the authors have broadened the everyday usefulness of this book as a guide.

Although it is neither economically nor always accurately written, I consider this book to be helpful as a guide (but not as a formula) for antimicrobial use in dental practise.

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## Concerns Regarding Infection Control Recommendations for Dental Practice

*John Hardie, BDS, M.Sc., FRCDC*

### Introduction

Canadian dental health care workers, according to the results of a recent survey, have reservations, fears and concerns regarding both the treatment of HIV+/AIDS patients and the implementation of current infection-control recommendations. A previous article addressed the common anxieties of these individuals with regards to treating HIV-infected patients.<sup>1</sup> This paper examines their concerns regarding recently-introduced infection control protocols.

### Concerns

In the 1991 survey,<sup>2</sup> dental personnel expressed several concerns about infection-control procedures. These related to:

- a) The effectiveness of recommended methods
- b) Waste products
- c) Aerosols
- d) Professional and media reactions
- e) The lack of government regulations

### Discussion

#### a) Effectiveness of Recommended Methods

During the last decade, a plethora of infection-control articles has appeared in the dental literature. Much of this excess has been devoted to instructional papers and text books. However, the majority of these articles did not provide reproducible scientific results to justify the protocols being recommended.

The current interest in the prevention of disease transmission has also spawned a commercial bonanza for the manufacturers and distributors of infection-control products. Unfortunately, the competitive nature of the resulting promotions and advertisements has caused some confusion among dental consumers. Given this situation, it is easy to understand why questions are now being asked about

the effectiveness of recommended infection-control protocols.

Obviously, it is easier to appreciate how useful and necessary various infection-control measures are (or are not, for that matter) if the reasons behind their proposed implementation are made clear. This approach will be adopted in the discussion of surgical instruments, barrier techniques, and environmental surface and equipment disinfection that follows.

### Surgical Instruments

It has long been accepted that the surgical instruments used to invade into the body beyond the skin or mucous membranes – scalpels, retractors, forceps, needles and sutures, for example – can create ideal portals of entry for potentially pathogenic microorganisms. There is also no question that the risk of infection is substantially reduced when sterile invasive and/or surgical instruments are used.

In this context, sterilization is defined as: "the destruction or removal of all forms of life, with particular reference to microorganisms, especially bacterial and mycotic spores."<sup>3</sup> The most effective and reliable method of achieving sterilization is to employ heat, either in an autoclave, chemical vapor or dry-heat format. Sterilizers of this type must be used and maintained according to the manufacturer's directions, and since they are sensitive and sophisticated devices, their reliability must be tested regularly. This is best accomplished by using so-called biologic monitors, which consist of non-pathogenic bacteria. These organisms resist destruction at high temperature.<sup>3</sup> To destroy them, a higher temperature must be reached and maintained for a definitive period. If the monitors cannot be grown in an appropriate medium, after their recovery from the sterilization cycle, the sterilizer is deemed effective.

It is important to emphasize, here, that autoclave tape does not monitor the effectiveness of a sterilizer. It indicates that a certain temperature has been

reached, but not that the temperature has been sustained long enough to induce sterilization. In many operating rooms, biologic monitoring is performed on every sterilization cycle. However, in dental practice this frequency could be reduced to once per week.

All surgical and invasive instruments or devices must be subject to sterilization. However, it is debatable whether non-invasive instruments such as mouth mirrors, impression trays and X-ray film holders must be sterilized.

In recent years, while the significance of sterilization has not been discounted, the protection of dental personnel from the pathogens carried by patients and in the dental environment has become an integral aspect of infection control procedures.

### Barrier Techniques

There is no historical evidence to suggest that the morbidity or mortality suffered by dental personnel due to infectious diseases are different from the levels found in the general population, with the possible exception of hepatitis B and herpes simplex infections. Additional support for this concept may be gleaned from a 1990 Medical Research Council of Canada publication.<sup>4</sup> It lists the pathogens that usually produce the very serious and often untreatable human diseases that can be readily transmitted from one individual to another, directly or indirectly or by casual contact (Table I). No bacterial, fungal or parasitic-induced infections are on the list. While some viral related diseases are included, they are rare and unlikely to be experienced in the average North American dental practice.

In other words, during their daily activities, dental personnel are not typically exposed to very serious, highly contagious and untreatable diseases. While it is true that less serious diseases such as the cold, chicken pox, German measles, mumps, T.B., gonorrhea and syphilis have the potential to be trans-



mitted during dental treatment, these are common diseases for which the specific route of infection is often difficult to establish. As stated previously, there is no proof that dental workers are compromised by such diseases to a greater extent than the general public.

Nevertheless, the AIDS crisis has generated a revival of interest in tuberculosis transmission from infected persons to health care workers. Tuberculosis is transferred via infected droplets inhaled by a susceptible host. Factors associated with susceptibility are low levels of education, lack of sanitation, overcrowded living conditions and immunosuppressed states. None of these conditions are generally allied with members of the dental profession who, while perhaps having a higher exposure to T.B. than the general public, are by nature of their lifestyle less susceptible to T.B.

In fact, it appears as if the current emphasis on personal safety and environmental hazards is related to two conditions, hepatitis B and AIDS. Hepatitis B is not a new disease, although the causative virus, HBV, was not identified until 1965.<sup>3</sup> The virus is transmitted via percutaneous and nonpercutaneous (saliva, blood) routes.

Various surveys conducted since 1972 have demonstrated that dentists have a greater risk of being exposed to HBV than the general population. In addition, there is a higher ratio of chronic hepatitis B carriers among members of the dental profession than among members of the public.<sup>3</sup>

Between 1974 and 1987, four general dentists and six oral surgeons have been implicated in transmitting hepatitis B to a total of 175 patients.<sup>3</sup> In most instances, this occurred because the dentists had hepatitis B at its most active infectious state and/or injured their hands while performing invasive procedures without wearing gloves.<sup>5</sup> It is reported that such transmissions decreased dramatically after the dentists involved began wearing gloves, masks and protective eye wear.<sup>5</sup> Whether this decrease was entirely due to the barriers worn or to improved surgical techniques and/or recovery from acute infectious hepatitis B is a mute point. However, it has definitely been established that hepatitis B vaccination is by far the most effective method of preventing the transmission of the disease to or from health care workers. In fact, there is no doubt that a national universal hepatitis B vaccination program, begun at an early age, would be more cost effective

than the millions of dollars currently being spent on gloves and masks. All dental personnel should receive the hepatitis B vaccination. Their families, household members and sexual partners should be similarly vaccinated.

Unfortunately, the hepatitis B vaccine is not 100 per cent effective in all individuals – about four to seven per cent of recipients fail to develop effective antibody levels.<sup>3</sup> Therefore, it makes sense for all dental personnel to have their hepatitis B surface antigen antibody level determined approximately six months after receiving their last vaccination. If this level is below the optimum level, and this situation continues after two additional vaccinations, it is safe to assume that the individual involved is either a non-responder to the vaccine – and therefore remains at risk for hepatitis B – or a chronic carrier of the virus with the potential to infect others. Under such circumstances, dental workers should wear gloves, masks and protective eye wear during all intra-oral procedures to assist in avoiding the disease, and should practise in a careful, methodical manner to avoid transmitting the disease. However, it must be emphasized that for 95 per cent of dentists and their staff, the best protection against hepatitis B transmission is vaccination and not the wearing of gloves, masks and eye glasses.

There are reports of dental personnel both acquiring and transferring herpes simplex infections.<sup>6</sup> The route of transmission is by direct contact between the oral cavity and the fingers. This can be effectively avoided if dental personnel wear gloves for intra-oral procedures. Such glove wearing will also reduce the theoretical risk of syphilis being transferred from the mouths of infected patients to dental staff.

In the early 1980s, AIDS and HIV infection quickly became established as significant medical and social problems. As new conditions that attracted public and media attention, they became encased in a net of misunderstanding, suspicion and paranoia. Once it was established that HIV could be transmitted by blood, the Centers for Disease Control (CDC) – in the mid 1980s – introduced the concept of “universal precautions” in an attempt to quell mounting anxiety, principally among health care workers. The idea of universal precautions is to approach every patient as if he or she were infected with an incurable, readily transmissible infectious disease. It is a form of reverse quarantine in which every patient is

assumed to have a deadly infection. Every patient must therefore be isolated from health care givers by physical barriers, such as gloves and masks. It is a peculiar irony that normal quarantine procedures definitely separate those with serious infectious diseases from the rest of society (thus curtailing the spread of these diseases), while universal precautions do nothing to restrict the social activities of patients who are perceived as having some dangerous contagion. The reason for this is that universal precautions were recommended solely to protect the skin and mucous membranes of health care workers from contact with blood and other body fluids, such as semen, vaginal secretions and cerebrospinal, peritoneal, synovial, pericardial, pleural, amniotic and (in dentistry) crevicular fluid. The practicalities of universal precautions as recommended by the CDC<sup>7</sup> are:

- Gloves should be worn. Masks, eye wear and gowns should be worn if there is a likelihood of splashes from blood and/or the listed fluids.
- All sharp instruments and devices should be handled carefully, with all used needles, scalpels, sutures, etc. being placed in puncture-resistant containers.
- Hands should be washed if they are contaminated by blood and/or the other fluids.
- Health care workers with weeping rashes and/or open sores should refrain from direct patient care and the handling of patient care equipment.
- Ventilation devices should be readily available.

The CDC recommendations – proclaimed in 1987 – were immediately accepted by many health care professions and their associations. The result was a massive diversion of limited health care dollars to the purchase of gloves, masks, gowns, ventilation devices and puncture-resistant boxes. This occurred even though no studies had (or have) been published on the effectiveness of universal precautions. A recent Canadian investigation revealed that the annual cost of using universal precautions to prevent a single case of AIDS or HIV infection may be as high as \$16 million to \$129 million.<sup>7</sup>

In assessing the effectiveness of universal precautions, it is worthwhile to note that:

- Gloves do not prevent needlestick injuries. An HIV surveillance





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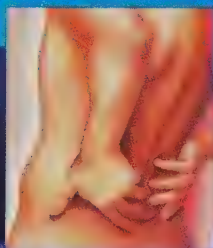
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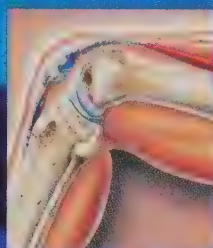
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study undertaken by the Federal Centres for AIDS found that 163 (69 per cent) of the 237 health care workers who sustained needlestick injuries were wearing gloves.<sup>8</sup>

- Universal precautions do not guarantee careful handling of sharp instruments. In the above study, 41 per cent of the needlestick injuries were due to recapping a used needle or improperly disposing of a used needle.
- Neither the Federal Centre for AIDS' study nor the CDC has documented HIV infection following the contamination of the intact skin or mucous membranes of health care workers with HIV-positive blood.
- The Federal Centres for AIDS' study<sup>8</sup> has failed to reveal any HIV infection among health care

workers subsequent to needlestick injuries, scalpel wounds, eye splashes, skin contact and even open-wound contamination by HIV-positive blood.

- The danger of hepatitis B transmission to health care workers is most effectively reduced by vaccination.

**Table I** illustrates that health care workers, including dental staff, are unlikely to be exposed to the types of diseases for which the wearing of gloves, masks, gowns and eye glasses at all times would be useful preventive measures.

Therefore, knowing that HIV infection in Canada has not been transmitted via needlestick injuries, eye splashes or aerosols, and that hepatitis B transmission is best curtailed by vaccination, it would appear that there is little factual information to justify – from a disease

transmission perspective – the adoption of universal precautions or the routine use of personal protective equipment during the practise of dentistry, even including the wearing of gloves for all intra-oral procedures.

In recent years, considerable emphasis has been placed on environmental surface and equipment disinfection as integral ingredients of current infection control protocols. Is such workplace decontamination warranted, or is it an example of a misguided attempt to solve a problem which may or may not exist?

## Environmental Disinfection

Blood, saliva and the other debris found on counter tops, floors, walls, light handles, equipment switches, charts, pens, telephones, etc. are – in effect – waste products. If these waste products are to cause infectious disease, however, they must satisfy the same six criteria as described previously<sup>2</sup> for potentially infectious microorganisms. To transmit disease, these wastes must contain pathogens of sufficient virulence and quantity so that exposure of a susceptible host to one or more waste, via a portal of entry, could result in infectious disease. In reality, this occurs very rarely or never, because once they are removed from the human body, these wastes do not generally provide the conditions required to support the growth and survival of infectious agents.<sup>9</sup> This understanding has resulted in the Canadian Standards Association (CSA) recommending that:<sup>9</sup> "While any item that has had contact with blood exudates or secretions may be potentially infectious, it is not usually considered practical or necessary to treat all such waste as infectious. This includes items such as soiled dressings, sponges, surgery drapes, lavage tubes, casts, catheters, disposable pads, disposable gloves, specimen containers, laboratory coats, aprons and dialysis wastes such as tubing, filters, towels and disposable sheets."

Although the majority of these items are not typically found in a dental office, it is not difficult to apply the concept to counter tops, light handles, equipment switches and 2 X 2 gauze. Dr. C. Scarlett,<sup>10</sup> formerly a dental consultant to the CDC, has stated that there is hardly any epidemiologic evidence of disease transmission from the dental environment, while Dr. Omar Reid<sup>11</sup> is of the opinion that the need for decontamination of the dental workplace has been vastly exaggerated. These comments take on ever greater validity when it is

**Table I**

### Risk Group 4 Agents\*

|               |                                                                                                                                            |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Bacteria      | None                                                                                                                                       |
| Fungi         | None                                                                                                                                       |
| Viruses       | Arenaviridae<br>Lassaa, Junin, Machupo viruses                                                                                             |
| Bunyaviridae  | Genus Nairovirus<br>Crimean-Congo hemorrhagic fever                                                                                        |
| Filoviridae   | Marburg virus<br>Ebola virus                                                                                                               |
| Flaviviridae  | Tick-borne encephalitis complex, including:<br>Russian Spring-Summer Encephalitis<br>Kyasanur forest virus<br>Omsk hemorrhagic fever virus |
| Herpesviridae | Alphaherpesvirinae<br>Genus Simplexvirus: Herpes B virus<br>(Monkey B virus)                                                               |
| Poxviridae    | Genus Orthopoxvirinae<br>Variola<br>Monkeypox                                                                                              |
| Parasites     | None                                                                                                                                       |

\*Risk Group 4 (high individual risk, high community risk): A pathogen that usually produces very serious human or animal disease, often untreatable, and may be readily transmitted from one individual to another, or from animal to human or vice-versa directly or indirectly, or by casual contact.

(Taken from: *Laboratory Biosafety Guidelines*. Medical Research Council of Canada (MRC/Health and Welfare Canada. 1990)



appreciated that the current emphasis on environmental surface disinfection is being generated by two diseases, namely HIV infection and hepatitis B. There is no proof, and unlikely ever to be documentation, that HIV is transmitted via inanimate objects. In fact, the simple act of drying will reduce the concentration of HIV in blood by 90 to 99 per cent,<sup>9</sup> effectively reducing the virus's dose and viability. This may be one reason why there are no reports of HIV being transmitted via inanimate objects to the care providers, household members or "live-in" companions of patients with HIV+/AIDS.<sup>12</sup> Although the number of reported cases of hepatitis B in Canada increased from three in 1969 to 3,005 in 1987, continental North America (excluding northern Canada) remains among the world's lowest areas for hepatitis B infection. Carrier rates here are generally less than or equal to two per cent, compared to rates of seven to 20 per cent in East Asia and South Africa.<sup>13</sup>

The risk of hepatitis B transmission is high when an individual is exposed to infected fresh blood and/or saliva.<sup>3</sup> However, once removed from the body, blood and saliva become waste products and provide an environment that is unfavorable to the hepatitis B virus. This reduces the risk of transmission from casual contact<sup>4</sup> or inanimate objects.<sup>9</sup>

If dried blood, blood spatters or aerosols were a source of hepatitis B transmission, it is likely that the percentage of dentists with serological markers indicative of previous exposure to the hepatitis B virus would be considerably higher than the accepted levels of approximately 10 to 13 per cent.<sup>3</sup> The nature of hepatitis B is that everyone is at potential risk, since accidental exposure to infected blood cannot be prevented. In reality, however, dental patients are not at risk from the environmental surfaces and equipment in dental offices, while infections directly to and from dental staff are effectively controlled by vaccination. Therefore, it does appear as if currently recommended surface disinfection protocols are an answer to a perceived problem as opposed to a real problem.

### Equipment (Instrument) Disinfection

Disinfection is a process that kills most disease-producing microorganisms, but rarely kills all spores.<sup>9</sup> Therefore, unlike sterilization, which either is or is not accomplished, disinfection is a less precise physical phenomenon, with

**Table II**  
**Handpiece Disinfectants**

| Product        | Active Ingredient | Dilution with Water | Contact Time |
|----------------|-------------------|---------------------|--------------|
| Wescodyne      | Iodine            | 1:200               | 10-30 mins.  |
| Biocide        | Iodine            | 1:200               | 10-30 mins.  |
| Pathex         | Phenolics         | 1:32                | 10 mins.     |
| Multicide Plus | Phenolics         | 1:32                | 10 mins.     |
| Surfex-E       | Ethanol           | concentrate         | 3 mins.      |

(From: *Recommendations for Infection Control Procedures*, Canadian Dental Association, April 1988.)

levels of disinfection being recognized as follows:<sup>9</sup>

**High-Level Disinfection** – the process of killing vegetative bacteria, tubercle bacilli, most spores, fungi, and lipid and nonlipid viruses.

**Intermediate-Level Disinfection** – the process of killing vegetative bacteria, tubercle bacilli, fungi and lipid and nonlipid viruses. This class of disinfection kills some spores.

**Low-Level Disinfection** – the process of killing most vegetative bacteria, fungi and lipid viruses. This class of disinfectants will not kill spores or non-lipid viruses.

Its division into various levels, combined with it not being a finite condition, makes it difficult to determine when disinfection has or has not been achieved. This assessment depends on which specific organisms disinfection is intended to destroy. Three significant microorganisms in dentistry are HIV, HBV and the tubercle bacillus. The former two, being lipid viruses, are destroyed by low-level disinfection, while the latter is killed by intermediate-level disinfection. Thus, instruments that are non-invasive or which by the nature of their physical state cannot be sterilized are effectively disinfected by being exposed (according to the manufacturer's instructions) to intermediate-level disinfection. It is suggested that this is an appropriate method of decontaminating mouth mirrors, impression trays orthodontic instruments, X-ray holders and similar devices.

Whether handpieces should be sterilized or disinfected remains a controversial issue. In general dental practice, the handpiece is not an invasive instru-

ment, although the dental bur is (the bur should be sterilized or discarded after use). Therefore, there would appear to be minimal justification for subjecting the handpiece to the rigors of heat sterilization, when intermediate-level disinfectants will destroy all significant microorganisms. This is accomplished by:

- Flushing the handpiece for approximately 30 seconds with water.
- Disconnecting the handpiece from the hose.
- Cleaning all visible parts of the handpiece free of blood, saliva and other debris. Alcohol, water, and low-level disinfectants may be used for this purpose.
- Surrounding the handpiece by a gauze pad soaked in an intermediate-level disinfectant (Table II) for 10-25 minutes.
- Wiping the handpiece free of the disinfectant.
- Maintaining and lubricating the handpiece according to manufacturer's instructions.

This is a cost-effective method of decontaminating a handpiece. A similar technique may be applied to ultrasonic scalers and the handles of triple syringes. It is appreciated that this technique will not remove blood and other debris that may remain inside the handpiece. However, there is no evidence<sup>9</sup> that such wastes are infective.

Recently, attention has focused on the dental impression as an inanimate object that may transfer disease. Although most common disinfectants do not alter the dimensional stability of most impression compounds significantly, it has not been demonstrated that the waste microorganisms on the



impressions will cause disease in a susceptible host. It is highly unlikely that the microbes on an impression would retain any pathogenic viability after being subjected to rinsing under running water, heat from the exothermic reaction of setting plaster, and "drying out" on the surface of a model.

Prior to disinfecting instruments, they must be made visibly free of all blood, saliva and protein. Such cleaning is probably the most significant procedure in successful disinfection, and may be accomplished as described for dental handpieces. With the above concepts in mind, disinfection does have a role in dental infection control, provided its use is tempered by a knowledge of how diseases are transmitted and the limitations of the disinfecting process. Thus, disinfectants are useful as:

- Holding solutions into which all used instruments or devices are placed prior to being cleaned for sterilization or further disinfection.
- Immersion solutions into which all visibly clean instruments or devices (which need not or cannot be sterilized) are placed for intermediate- to high-level disinfection using chlorines, iodophors or dual synthetic phenols.

There is no doubt that the recommended infection control methods are effective. A more significant question is, are they justified? The sterilization of surgical, invasive instruments to prevent the transmission of disease from patient to patient is a necessary, readily accomplished and proven procedure. Gloves worn during intraoral procedures act as barriers to prevent oral manifestations of some, especially blood-borne, infectious diseases from infecting dental workers via open wounds or sores on their hands. Vaccinations, especially for hepatitis B, are very cost effective methods of ensuring that dental staff are not susceptible to disease. Intermediate-level disinfection, using appropriate products according to the manufacturer's directions, is justified for non-invasive dental instruments and devices, including dental handpieces. However, the use of relatively powerful toxic chemicals to disinfect the dental environment and associated inanimate objects appears to have no validity. Visibly cleaning the working environment with water, alcohol or "elbow grease" will avoid this very theoretical route of disease transmission, while decreasing the atmospheric pollution created by toxic chemicals.

## b) Waste Products

Recent reports of medical wastes washing up onto beaches have raised concerns among the public, politicians and health care providers that such products could transmit disease, including AIDS. However, to have the potential to cause disease, these wastes must contain microbes of sufficient virulence and amount, and be exposed to a susceptible host via an appropriate portal of entry. This is an unlikely sequence of events. Therefore, it is not surprising that there have been no reports, in Canada, of medical wastes transmitting infectious diseases.<sup>9</sup> Again, the current anxiety surrounding medical wastes appears to be driven by a misunderstanding of HIV infection rather than by factual, epidemiologic or historical data.

In Canada, regulations concerning medical waste management are prepared and implemented by a haphazard arrangement of municipal, provincial and federal agencies. CSA was commissioned to recommend a uniform code of practice for the management of biomedical waste in Canada. In January 1991, CSA produced draft recommendations<sup>9</sup> for consideration by the Canadian Council of Environment Ministers. Recommendations of dental significance were that:

- Biomedical waste would include tissues, organs, body parts, body fluids, blood and blood parts, but would exclude hair, nails and teeth.
- Biomedical waste would include needles, syringes, blades or other sharp instruments which could produce cuts or punctures.
- Blood, suctioned fluids and secretions would be disposed of via sanitary sewers.
- Teeth, soiled dressings, sponges, disposable gloves, disposable saliva ejectors, etc., would be deemed household waste and disposed of as such since there is no evidence that such items pose an infection hazard any greater than that presented by residential waste.
- Used needles and sharps should not be recapped, bent or broken prior to disposal, but should be placed in puncture resistant containers and disposed of by incineration or as general waste following autoclaving.

The code of practice recommended by CSA has yet to be enacted at a national level, an event that would sim-

plify the whole area of waste handling, especially from a dental perspective. Until this occurs, local dental societies should become conversant with the waste management regulations pertinent to their constituencies, and inform their members about them. In addition, the societies could organize a waste management service for their members, which would ensure that needles and sharp wastes were collected and disposed of by licensed agencies.

Apart from physical injuries, used needles and sharps are perceived by numerous authoritative organizations as having a significant potential to transmit hepatitis B and HIV infection. Hepatitis B is effectively prevented by vaccination, while HIV infection via needlestick and other injuries is, according to the Federal Centre for AIDS,<sup>8</sup> an unlikely event. Nevertheless, it is prudent to be careful when handling such wastes. In this regard, numerous needle guards and safe recapping devices are available.

Applying the principles that govern the transmission of infectious diseases to medical wastes is a rational method of assessing how potentially infectious these products really are. This approach has allowed CSA to develop a series of recommendations that are practical and readily implemented by dental practitioners, while reducing the fear that infectious diseases – especially HIV – are likely to be transmitted from waste products.

## c) Aerosols

In the context of infection control, aerosols may be defined as solid and/or liquid airborne particles that contain microorganisms. However, to cause infectious disease, these agents must be present in a sufficient amount and have a sufficient virulence, and a susceptible host must be exposed to them via a portal of entry. Therefore, although the aerosols produced by dental high-speed instrumentation may contain microbes such as staphylococci, streptococci, diphtheroids, pneumococci, tubercle bacilli, influenza virus, hepatitis virus, herpes simplex virus and neisseria,<sup>3</sup> there is no documentation to indicate that these aerosols have caused infections within dental staff. Indeed, 90 per cent of the bacterial shower released by ultrasonic scalers contains alpha hemolytic streptococci which – to date – has not been associated with any airborne infections.<sup>3</sup> This should not be surprising, since most of the bacteria dispersed from the oral cavity are of low patho-



genicity, and are unlikely to infect surgical wounds<sup>14</sup> or the intact skin and mucous membranes of dental workers.

Current infection control guidelines recommend the wearing of face masks during dental procedures. Is this justified? A recent study on face masks by Clinical Research Associates demonstrated that most masks could filter out 30 to 98 per cent of airborne microbes of greater than three to five microns in diameter<sup>15</sup> – three to five microns being the size of the filter holes. This means that most bacteria, which typically have a diameter of more than five microns, would be incapable of passing through these masks. However, since oral bacteria are of low pathogenicity, and current infection control procedures are being driven by viral diseases such as those caused by HIV and HBV, this protection is relatively useless. HIV has a diameter of 0.10 microns and HBV one of 0.042 microns.<sup>15</sup> Influenza and common cold viruses range in diameter from 0.08 to 0.20 microns.<sup>15</sup> Therefore, even the most effective mask, one with three-micron filter holes, would fail to filter out these viruses. Any viruses released during the creation of dental aerosols exist within droplet nuclei, 95 per cent of which are five microns or less in diameter.<sup>3</sup> The dental mask is therefore an inefficient barrier against the viruses contained in aerosols. In reality, this is an insignificant concern, since both HIV infection and hepatitis B are blood borne, not airborne, diseases.<sup>16</sup> The wearing of masks to prevent HIV infection and hepatitis B is a cost ineffective exercise.

Although the aerosols created by dental treatment may contain numerous microbes, these are of low pathogenicity and have not been shown to be a source of disease among dental personnel. There is little justification for the wearing of masks from an infection control perspective. They are, however, useful in masking the smells associated with dental care, preventing the direct inhalation of amalgam and porcelain debris and as an esthetic device if the dentist has a "dripping" nose secondary to a cold.

#### **d) Professional and Media Reactions**

It is naive to assume that the current interest in infection control would have occurred without the discovery of AIDS and HIV infection. Although hepatitis B is a more readily transmitted disease, it has not aroused the interest of medical and dental personnel, patients, the lay

public, media, manufacturers and politicians. Fortunately, with the development of an effective vaccine the potential exists – with properly designed inoculation programs – to effectively eliminate hepatitis B from our society.

AIDS was initially recognized in the early 1980s as an unusual collection of clinical signs and symptoms presenting among the homosexual communities of California and New York. The identification of the probable causative agent (human immunodeficiency virus, a previously unknown retrovirus) and the diagnosis of AIDS among prominent North American entertainers created, in the mid-1980s, an aura of notoriety about the syndrome and its causes. The ensuing publicity, regardless of whether it appeared in the general media or professional publications, has tended to exaggerate and fuel the myths, misunderstandings and suspicions surrounding HIV. Even today, after a decade of experience with AIDS, public policies on the disease tend to be formulated in reaction to perceived public concerns, and are not based on a comprehensive analysis of the available data or our current knowledge of microbiology and disease transmission. The current atmosphere is clouded by the many emotional, societal and ethical issues, which are now an integral part of the AIDS dilemma. In such an environment, professional organizations like CDA would have been irresponsible if they had not provided their members with current information and direction, even if this process was driven, in part, by the need to respond to media enquiries.

Most dental organizations responded to the AIDS question by reviewing their current infection control guidelines (if they existed), and revamping them to reflect the potential for HIV infection to occur in the dental office. Inevitably, given their lack of experience in dealing with AIDS, the individuals charged with modifying infection control protocols proposed recommendations that were overly cautious, exaggerated and cost ineffective. This has added millions of dollars in unnecessary expenditures to Canada's already strained health care budgets. Concurrently, both health care providers and patients are confused by the mixed messages they are getting from the so-called experts. Many are questioning why, if HIV is not readily transmitted, they should be forced to wear protective paraphernalia, cover equipment with plastic wrapping and decon-

taminate the operatory? It is contended that such actions are excessive and ought to be rescinded, but only by informed practitioners who are able to successfully address the fears and anxieties of their patients. The development of knowledgeable practitioners who conduct infection control in a rational, justified manner should be a current objective of Canadian dentistry's academic and professional associations.

#### **e) Lack of Government Regulations**

A recent survey on infection control<sup>2</sup> revealed that dental staff were concerned about the lack of government regulations on infection control, particularly with regards to the licensure and distribution of disinfectants. Presumably, this is related to the many disinfectants and other infection control products that are now flooding the market in response to the AIDS crisis. The choice for dentists and their staff is made more confusing by advertisements which suggest that not using the product will have disastrous, life-threatening effects for dentists and patients alike, especially when the Environmental Protection Agency<sup>17</sup> has stated that as many as 20 per cent of its recommended disinfectants may be ineffective.

In Canada, it is now relatively simple for a manufacturer to obtain approval to market a disinfectant, as long as the manufacturer can demonstrate that the product satisfies certain criteria. There are no independent government testing facilities available to confirm the manufacturers' claims. To partially offset this deficiency, a sub-committee of the General Standards Board of Canada has recommended that more stringent criteria be applied to disinfectants.<sup>18</sup> To some extent, this may be of no more than academic interest to dental staff, as, from a practical perspective, the cost effectiveness of surface disinfectants is highly questionable.

There are government regulations concerning the handling and disposing of waste products. However, they involve several levels of government in an often confusing and contradictory manner. It is hoped that the Code of Practice for Waste Management,<sup>9</sup> as proposed by CSA, will be adopted by federal, provincial and municipal regulatory agencies.

The results of the survey<sup>2</sup> did not suggest that dental staff want a government agency to begin policing infection control procedures in their offices. In fact, the dental profession in Canada



would appear to be adopting a prudent approach on this issue, one that will be envied by their colleagues in the United States. In the U.S., the Occupational Safety and Health Administration (OSHA) has instituted rules on infection control and enforces their compliance. The American Dental Association has already filed an administrative challenge against OSHA for fining a dentist who – among other things – removed his safety glasses when administering anesthetic to an excited child.<sup>19</sup> In general, OSHA's infection control regulations are based on unrealistic expectations of the ability of both HIV and HBV to transmit disease. It is suggested that the creation, implementation and enforcement of OSHA regulations is cost ineffective from an infection control perspective. Such controls need never be implemented in Canada if the dental profession and its regulatory bodies demonstrate a responsible, informed, and rational attitude toward the prevention of disease transmission.

## Summary

It goes without saying that the members of any professional group are more likely to modify their behavior if they are provided with logical, rational reasons to enact the suggested change. In the mid 1980s, health care providers, including dental personnel, were advised to adopt universal precautions and to alter their infection control habits with minimal justification, apart from the general unease and paranoia surrounding AIDS. Therefore, it is understandable that some practitioners would react with scepticism to the idea that their traditional infection control techniques were less than adequate, while others would overwhelmingly embrace the new recommendations in the misguided belief that personal, patient, staff and family safety would be enhanced. This predictable confusion is epitomized by the dentist who "sterilizes" extraction forceps by immersing them in alcohol for 10 minutes, versus the dentist who wears gloves, mask and disposable gown to conduct a recall examination. And if dentists are perplexed, it is clear that their staffs are equally, if not more confused, since they are exposed to the exaggerated claims and counter claims of sales agents.

The microbes encountered in dental practise, apart from the hepatitis B virus, pose no significant risk to dental personnel or their patients, and the danger of hepatitis B transmission is re-

duced most effectively by vaccination. In reality, the genesis of dentistry's current emphasis on infection control resides entirely with HIV disease. But there is no credible clinical evidence to suggest that HIV infection is transmitted via dental treatment. Indeed, it may be theorized that for such a transmission to occur, the blood stream of the susceptible recipient would have to be invaded directly by a pathogenic inoculum of the virus – an unlikely event in the normal practise of dentistry. Under such circumstances, infection control practises should ignore the danger of HIV transmission, but concentrate on:

- Sterilization of all surgical and invasive instruments to protect patients from potential cross-infection.
- All dental staff receiving hepatitis B vaccinations.
- Dental staff wearing gloves, especially while performing intraoral procedures with blood release, and handling used instruments, to protect them from direct contact with potential pathogens.
- Working in a clean environment, in which blood spills and splatters are removed mainly for esthetic reasons.

Such measures reflect the actual potential for disease transmission, as it exists in dentistry. They are justified and economical, and will be implemented by concerned but knowledgeable dental staff.

Dr. J. Hardie is the head of the department of dentistry at Vancouver General Hospital.

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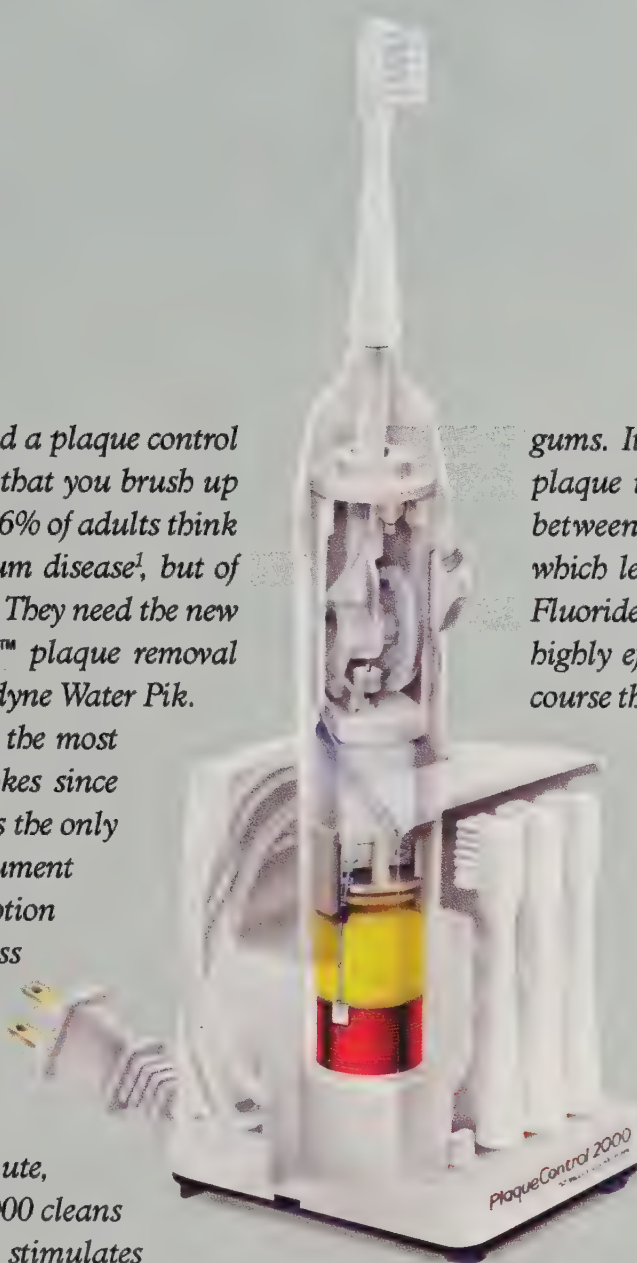


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## Dentists Overcome AIDS Rumors

P. Ralph Crawford, BA, DMD

This is the story of two dentists whose lives were turned into nightmares because of malicious rumors about AIDS. Rumors that nearly destroyed the practices of both men, and played havoc with their family and social interactions.

Perhaps it was bound to happen sooner or later. Perhaps it was inevitable that the public's fear of AIDS would be used as a weapon against innocent victims. But for two dentists in Atlantic Canada, that time came far too soon.

This is also a story of bravery. Of men who refused to be beaten, of two dentists who had the guts to face their problems head-on.

Both dentists, who practise in different small towns, were forced to go public by bringing their plight to the media's attention and issuing statements of denial. And while both men have since shed their scarlet letter, neither man will ever forget his personal nightmare.

### Dr. Douglas Musseau, Grand Falls, Newfoundland

Dr. Douglas Musseau, a 1983 graduate of Dalhousie University, set up his dental office in Grand Falls, Newfoundland, over eight years ago. It is a thriving practice, serving a number of communities within a 50 kilometre radius of the city.

His nightmare began last October, when a patient (and friend) informed him that a rumor had been circulating for weeks that Dr. Musseau was a homosexual and suffered from AIDS. "I didn't sleep that night," he said, "It was just a sick, sick feeling."

Dr. Musseau called a number of his patients and friends, and it soon became clear that the rumor was indeed widespread. In fact, it seemed as if he was the last person in town to know about it.

Dr. Musseau then informed the Newfoundland Dental Association and the provincial licensing authority about the rumors, and sought legal advice. The public relations firm that he engaged advised him to send a letter of explana-



Dr. Musseau (l) with his dental team, Sharon Comerford (c) and Roxanne Peddle. (Not shown, Thelma Greening.)

tion and denial to his active patients, but not to go public in the newspapers.

"It was devastating my family," he said. "We were even receiving harassing phone calls at home and we felt uncomfortable going out in public. Grand Falls is only a community of 16,000 and we felt as if everyone was looking at us."

Dr. Musseau decided to go public, believing that the rumors could have a devastating effect on his practice. There had been no sudden drop-off in appointments, yet, but with the rumors persisting and the continued calls to his office and home, he felt it was time to take action. "If I didn't do something, I might just as well pack my bags and leave town."

On December 17, 1991, Dr. Musseau sent a one-page letter to his patients:

Dear....

*I am aware that someone has started a totally malicious and unfounded rumor that I am a homosexual and have contracted the AIDS virus. This allegation is completely and utterly false.*

*The rumor is also being spread by other people besides the person who started it.*

*This rumor has caused considerable stress, frustration and anxiety to my family and me.*

*I have no idea why anyone would start such a malicious rumor and why others would continue it. Although, it appears to be an attempt to harm me and my professional status in the community. They have not succeeded and will not succeed and for this I deeply thank my patients, staff, friends and family for their tremendous support through this ordeal.*

*This type of malicious rumor constitutes slander and defamation. Thus, the person or persons responsible for starting and continuing the rumor are subject to a civil court action in the Supreme Court of Newfoundland, Trial Division, for damages, court costs and such other relief as the Court sees fit.*

*If you have any information that would lead to the identification of the person that started the rumor and the people who are repeating and spreading the rumor, please contact me at my office, my home or (call) my lawyer. The calls can be anonymous and will be kept in the strictest confidence.*

*In closing, I want to assure you I am not a homosexual and do not have the*





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*AIDS virus or any contagious disorder for that matter.*

*I also ask for, and would greatly appreciate, your support in putting an end to the malicious rumor.*

The next day, Dr. Musseau placed a paid advertisement in five local newspapers to discount the rumors. And his dental colleagues rallied behind him, by writing to the editors of area newspapers. The district hospital also made a public statement of support.

Shortly after releasing the public statements, Dr. Musseau was rewarded and gratified by the response of his patients and friends. They called, they dropped into the office and they sent cards.

Although the AIDs rumors did not have any long-term effect on his dental practice, the experience has left lingering memories in the mind of Dr. Musseau. "You suddenly realize how vulnerable you can be – it is a terrible ordeal to go through."

To date, Dr. Musseau has no idea who started the rumors or why, but he certainly feels he made the proper decision in openly facing the problem and going public.

### **Dr. Robert Hume, Woodstock, New Brunswick**

Dr. Robert Hume has maintained a family practice in Woodstock, New Brunswick – a town of about 5,000 situated in the St. John River Valley – since 1975, when he graduated from Dalhousie University.

His experience with the agony engendered by malicious rumor began

near the end of November in 1991, when a patient phoned the office and asked if Dr. Hume had AIDS.

Said receptionist Joyce Brown, "I was absolutely shocked, flabbergasted. I didn't know about the rumor. The patient said she didn't want herself or her children coming to the office – she wanted the charts to go somewhere else. It was scary. I didn't really know what to say."

Before long, the number of calls had increased to three or four a week. Dr. Hume attempted to deal with them personally – he thought they would eventually die off. But people began stopping him and his staff on the street and calling them at home. He knew some definite action had to be taken to stop the rumor mongering.

In early February, he went to Presque Isle in Maine – Woodstock is only 15 kilometres from the U.S. border – for an AIDS test. He posted the negative result in his office.

Because the American test was anonymous, he subsequently obtained a New Brunswick test that noted his name and address. The results of both tests were then displayed side by side in Dr. Hume's practice. He also contacted the local Woodstock newspaper and requested coverage of his predicament. Little did he realize the amount of nation-wide media attention his public proclamation would receive. The story, picked up by Canadian Press, ran in newspapers across Canada.

Like Dr. Musseau, Dr. Hume doesn't know who started the AIDs rumors against him, or why. He has talked to the police and his lawyer, but believes

the chances of apprehending the instigator are remote.

Dr. Hume will remember the agony he experienced, and the potential wasteland malicious rumors can make of a dental practice, for a long time. He is greatly appreciative of the way his six employees stood behind him throughout the crisis. "They supported me 100 per cent," he said. "And they were actually contacted more than I was by our patients."

When asked if his practice had suffered as a result of the rumor campaign against him, Dr. Hume said: "No, I already had a busy practice and despite a drop-off at the peak of the event, things seem back to normal. In fact, I am planning on bringing two associates into my practice this fall."

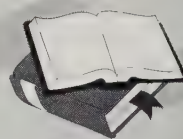
Still, Dr. Hume is glad he went public, openly defying the perpetrators of the gossip and rumors. He advises other dentists who find themselves in similar circumstances to do likewise.

Will other incidents arise? A cross-country check with the provincial licensing authorities indicated that – at least for now – the Grand Falls and Woodstock occurrences are isolated. Based on the experiences of Drs. Musseau and Hume, however, it is fair to say that, in the future, dentists who are victimized by malicious rumors should immediately contact their licensing authorities. They can take heart from knowing that, for at least two dentists, facing adversity head-on was enough to alleviate the problem.

*Dr. P. Ralph Crawford is the editor of the Journal of the Canadian Dental Association.*



*Dr. Robert Hume and staff, of Woodstock, New Brunswick, display his negative AIDS test results. Front row, left to right; Connie Demerchant, Annette McBride, Lynn Hatfield. Back Row, Debbie Watson, Dr. Hume, Jennifer Russell, Joyce Brown.*



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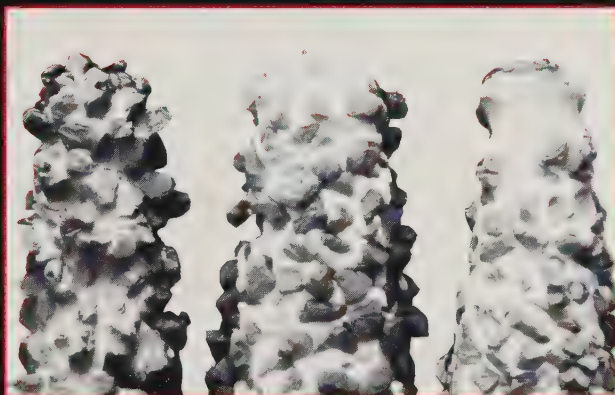
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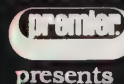
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<sup>1</sup> American Dental Association Council on Dental Therapeutics. Acceptance of (synthetic phenol) disinfectant for instruments and equipment. JADA 110 394, 1985

# Confused about infection control?

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The amount of information generated today about infection control is overwhelming. To clarify the confusion, ignore the claims and focus on the facts.

**FACT:** The CDA and CDC have both stated that all heat stable dental instruments should be routinely sterilized between use by autoclave, dry heat or chemical vapor.

**FACT:** There are many surfaces and instruments in a dental operator which cannot undergo sterilization. A high-to-intermediate level disinfectant is therefore required. For complete disinfection, you want a tuberculocidal, broad spectrum kill, an EPA and ADA acceptable product, non-corrosive to instruments and as non-toxic as possible.

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# Specialty Feature

## Another Perspective of AIDS

Daniel Lynch

*Because a promiscuous Magic Johnson has the AIDS virus, why scare John and Jane Doe, whose chances of catching it may be remote?*

A scary wire service story came bouncing into my newspaper's computer system recently. The slug was "Killer Garages." The article said that over the past decade 48 Americans had been killed by automatic garage doors.

That seemed like a lot of people to die in such a strange way. On the other hand, when I looked further into the ways people die, I discovered that during the same 10-year period about 1,000 Americans had been killed by lightning, and another 150 or so had died when planes fell out of the sky on them. So, as tragic as it was that anybody had been killed by an automatic garage door, a little research revealed that the chances of dying in that manner are incredibly remote.

Many newspapers probably ran that story without bothering to assess how severe a threat automatic garage doors pose in comparison to other hazards. We journalists aren't very good at conveying to readers, viewers and listeners that we live in a world of relative risks. And we're not good at putting those risks in their specific social, economic, political or medical contexts.

Because of deadline pressures and our need to carve the broad spectrum of human events into bite-sized nuggets, we dish out a slice here, a chunk there. We keep it simple, tight and palatable. As a result, especially with complex science stories, we often transmit accurate facts but misleading impressions. Our failures in this regard can have enormous impact on public policy and private behavior.

Take, as a recent and conspicuous example, the press coverage of Magic Johnson's revelation that he carries the human immunodeficiency virus (HIV), which precedes AIDS. This was a big story, and it was covered intensely. Every paper and television report I saw

pointed out that AIDS – acquired immune deficiency syndrome – has killed more than 128,000 Americans since 1981. That number, however, was reported in the usual vacuum. Almost nobody pointed out that the death toll from AIDS during the past decade has been low compared with the deaths caused by cardiovascular diseases or cancer or diabetes or even drunk drivers.

Few of our readers, viewers or listeners realize that. After 10 years of the most intensive reporting ever lavished on any human ailment, the public remains stunningly uninformed about the relative risk of AIDS.

The U.S. government plans to spend roughly \$2 billion in fiscal 1992 to combat AIDS, which equals the \$2 billion it will spend to battle cancer. The \$1.13 billion it will spend on AIDS research alone this year dwarfs the \$844 million allotted for cardiovascular disease and stroke research. That's a noteworthy statistic when you consider that cardiovascular ailments, including stroke and hypertension, kill more people each month than AIDS is projected to kill this year. Cancer kills more people every six weeks than AIDS is projected to kill this year. Twice as many Americans died last year in auto accidents than died from AIDS; roughly the same number committed suicide.

The federal Centers for Disease Control (CDC) has estimated that 215,000 of the more than one million Americans infected with the HIV virus will die during the next three years. During the same period, 2.6 million Americans will be killed by cardiovascular diseases and another 1.5 million by cancer.

Most of our audience has grasped the reality that AIDS is a horrible ailment that causes immense human suffering and despair. But does the public understand the scope of that suffering when compared with that created by more common causes of death? In a May 1991 Gallup Poll of 1,014 Americans, respondents who were asked "What would you say is the most urgent health problem facing this country?" identified AIDS as a greater threat than cancer by a three to one margin.

They believed that AIDS was a greater threat than heart disease by a 23 to one margin.

Why do they think that? Because that's the message they've received from the news media.

The odds are that most people are unaware that CDC recently estimated that new cases of AIDS could remain constant for the next few years after reaching a minimum of about 60,000 per year. Roughly 49,000 Americans with AIDS are expected to die this year and an additional 53,000 in 1993. As tragic as those numbers are, they're still considerably less than the annual toll from pneumonia and influenza, also contagious ailments.

How is it that so much money is being spent to combat an ailment that kills so relatively few? It has happened in no small measure because of a remarkably successful media campaign waged by AIDS activists. They understood from the beginning that a large segment of the public believes that homosexuals are degenerates and sinners, and that intravenous drug users are even worse. Bigots and small-minded hypocrites wouldn't shed so much as a tear if AIDS were to wipe these people off the planet. Having identified their target audience, AIDS activists then worked hard and with amazing effectiveness to convince Americans that the risk of contracting the virus was not closely related to sexual or drug use habits.

Take, for example, an advertisement that I first saw in the New York City subway. It showed a young woman with a grim expression saying, "I remember my mother's advice. I never go out without my rubbers." Or the TV ad that features a young woman and states, "Anyone Can Get AIDS. Anyone." The ads, of course, were designed to persuade people to protect themselves against AIDS by using condoms. They were also something more. By featuring women as typical potential victims, the AIDS prevention advertising was designed to scare the hell out of everybody. It worked. The words "safe sex" fall freely from the lips of formerly swinging singles. Celebrities go on tele-



vision to assure everybody that AIDS doesn't discriminate against heterosexuals.

By omitting specifics on relative risks, the message that got across was one of substantial, more or less equal, risk for everyone. The equal-opportunities theme was aided enormously by the flawed ways in which we in the media cover the news. In Albany, New York, the leading hospital staged a press conference featuring what hospital officials presented as two typical AIDS patients.

One was a gay male, a member of the group that accounts for about 66 per cent of AIDS cases, the other a woman who had contracted the HIV virus solely through heterosexual sex, a member of the group that accounts for about three per cent of AIDS cases.

Later, New York state would begin a program of AIDS education for children as young as five years old. The state also recommended that doctors perform state-funded, \$6 blood tests on every person they saw who had sex outside a monogamous relationship or had used IV drugs. And this at a time when soaring health-care costs were deservedly a topic of growing public concern.

We in the media did what we always do. We reported these developments as they unfolded. We also, at least in the early stages, refrained from reporting what was at the time the primary mechanism for spreading the disease — anal intercourse. Most of us felt those words were too impolite for our audience. Instead of taking every opportunity to emphasize this key bit of information, we used euphemisms such as "exchange of bodily fluids" or "intimate sexual contact," which served to educate no one. Or, if we put "anal intercourse" into one AIDS story, we would carefully put it on an inside page or avoid it altogether in follow-up stories. As a result, children who became infected through blood transfusions came to be portrayed, by omission of context, as typical AIDS sufferers.

Saddest of all, however, many people whose lifestyles put them at greatest peril continued high-risk activities for months or even years after those activities had been identified by health authorities as deadly. Why? For the most part, because journalists were more worried about being polite than truthful.

Many editors and reporters are past that now. We're clinically specific in most cases. But we still fail to place our AIDS stories in a larger, more meaningful context. Virtually none of us cover-

ing the Magic Johnson story effectively explained that AIDS, for all its horror, is only one risk in a world of far greater risks.

We are, by the way, guilty of this all the time, especially with articles involving percentages. How many times have you heard or read that 50 per cent of U.S. marriages end in divorce? It's not true. Yes, the number of divorces each year is about half the number of marriages that same year. But that's like computing the death rate by comparing the number of people who die with the number of people who are born, ignoring those who neither were born nor died during that 12-month period. The 50 per cent divorce figure ignores the number of intact marriages from earlier decades than the divorce-laden 1970s and 1980s; the truth is that about one in 50 marriages ends each year, according to the National Center for Health Statistics. Pollster Louis Harris maintains that 90 per cent of marriages survive until one partner dies.

Another example: Most of our audience realizes that smoking is the leading cause of lung cancer. We've told them that repeatedly. But few know that only 10 per cent of smokers ever die from lung cancer, according to the National Institutes for Health. In fact only a quarter of all smokers ever die from *any* illness linked to their habit. We've almost never told them that.

The examples are endless. Look at our recent concentration in the Magic Johnson stories on the growth of AIDS among heterosexuals who don't use IV drugs. The percentage of AIDS cases attributed solely to heterosexual intercourse has jumped 40 per cent since 1989, according to the CDC. But that percentage hides the raw numbers involved: fewer than 3,200 of the Americans diagnosed with AIDS last year obtained the HIV virus via that route. Our stories have failed to communicate to our audience that male victims such as Magic Johnson who say they could only have contracted the disease through heterosexual sex are but three per cent of the total number of persons with AIDS. (Among both genders, it's six per cent.) And nobody knows how many of these men are telling the truth. We still live in a society where people have good and sufficient reason to lie about homosexuality and IV drug use.

The reality, painful though it may be to people concerned about discrimination against gays and the poverty-stricken minorities who make up the bulk of IV drug users, is that AIDS in the

United States remains overwhelmingly confined to members of those groups and their sexual partners.

Those who are affected solely through blood transfusions, including hemophiliacs, make up no more than three per cent of the AIDS population, and such infection is now considerably less likely with the safeguards put into place to protect the blood supply. *As for contracting HIV from your dentist, you're in much more danger from your automatic garage door.*

Despite the erroneous impressions left by our decade-long body of reporting, the reality is that for most Americans, cancer and heart disease remain far greater threats than AIDS. The CDC estimates that more than a million Americans presently have the HIV virus; the American Cancer Society estimates that 76 million people now living will develop cancer. One in three Americans will eventually die of cancer. And among the leading causes of death among Americans — including cancer and cardiovascular diseases — AIDS ranks 11th.

These numbers all prompt the question: Why is the medical establishment cooperating with AIDS activists in trying to convince the general population that we're all at substantial risk from the worst epidemic since the Black Plague?

The answer is that medical researchers are lobbying, as they should, for more money to develop vaccines for HIV and a wide variety of other viruses. The medical industry understands that the public money and political commitment necessary to wipe out HIV would be harder to come by if AIDS were to be widely perceived as anything other than a looming threat to everybody.

That's why Magic Johnson and the quality of our coverage of his story is so important. Other celebrity AIDS victims such as Rock Hudson and Liberace contracted the virus through homosexual relationships. Johnson, however, says he is among that minority of men who caught it from a woman. He has said that he never engaged in any homosexual act. Nobody to my knowledge has asked him publicly whether he ever took intravenous drugs.

As things stand, however, Johnson is the current face of AIDS to most of America.

It's almost a dictate of American journalism that editors and reporters focus uncritically on the victims of suffering. Many of us got into this business because we wanted to present people



## Annual U.S. Deaths

1. Diseases of the heart: 725,000 (34% of deaths)
2. Cancer: 506,000 (23%)
3. Stroke: 145,000 (7%)
4. Accidents, including auto wrecks: 94,000 (4%)
5. Respiratory diseases: 89,000 (4%)
6. Pneumonia/influenza: 79,000 (4%)
7. Diabetes: 49,000 (2%)
8. Suicide: 31,000 (1%)
9. Murder: 26,000 (1%)
10. Liver diseases: 26,000 (1%)
11. AIDS: 24,000 (1%)

Source: National Center for Health Statistics, 1990 estimates (latest available). If CDC estimates of a minimum of 49,000 deaths in 1992 and 53,000 deaths in 1993 are accurate, AIDS would rise to 7th. From January through October 1991, 16,233 Americans died of AIDS.

with the truth and prompt them to do the right thing for the oppressed, the less fortunate and the wrongly reviled. As a result, most journalists report on what a horrible disease AIDS is and on how devastating it has been. With a few exceptions, the press has reported the political debate over AIDS research and treatment largely in terms of how more money might be shaken free to fight this killer.

Most journalists simply haven't applied to the AIDS story the same standards we would apply to, say, defense spending.

So most Americans are certainly unaware that the country spends more to fight the No. 11 killer than the No. 1 killer. Or, to put it another way, the federal government will spend at least 20 times as much to prevent each AIDS death in America this year as it spends to prevent each death from stroke or heart attack.

Too many reporters and editors have treated AIDS only as an isolated medical story, ignoring the reality that this is also a story of cultural and political conflict, filled with the usual distortions we should expect in such stories.

None of this means that society shouldn't put as much muscle as it can into finding a vaccine that would relegate HIV, like the polio microbe, to the history books. The evil of AIDS is not its risk to the general population but that its victims are disproportionately young and disproportionately poor.

Though both cancer and cardiovascular diseases each kill more people under 50 than AIDS, it's also true that cancer, strokes, heart disease and pneumonia generally kill older people. AIDS too often cuts short the lives of people in their prime.

And AIDS is devastating black and Hispanic communities in many inner cities, with heterosexual contamination on the rise. If many Americans are relatively safe from AIDS, that is hardly an argument for turning our backs on the epidemic that is raging in some neighborhoods. We owe it to our sense of human decency and dignity to fight it

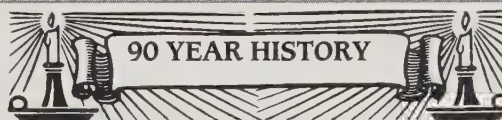
ferociously. "Safe sex" measures have their obvious validity against all levels of risk.

On the other hand, we have an obligation as journalists to relate the facts to the entire spectrum of human experience. Advocates, whether AIDS activists, tobacco industry spokespeople, cancer lobbyists or party politicians, routinely distort reality to achieve their ends. The partisan's role in our political system is to sell a point of view with blind devotion. The proper role of the journalist, though, is to examine the competing claims of advocates, to assess to what extent those claims conflict with reality and then tell the truth as best as it can be determined. That's why, in reporting on AIDS, it's useful to remember this:

Magic Johnson's illness is a tragedy, but so was the death of Gilda Radner, who died of cancer. And the reality, when you talk about death rates, is that for every AIDS victim there are 19 Gilda Radners. For every AIDS victim, there are two James Deans who die in car wrecks, a John Lennon who's murdered or a Marilyn Monroe who commits suicide. For every AIDS victim, there are 29 Elvis Presleys who die of cardiovascular disease.

There is no reason for people to be unduly fearful of personal vulnerability when their chances of contracting the AIDS virus are remote. And there is no reason for Americans to be as misinformed as they are about the relative risks of AIDS versus other ailments.

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# Case Report

## Dental Anesthesia and Shoplifting: A Case Study

*R.T. Foster, M. Pharm., PhD  
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### Introduction

In the spring of 1990, during the course of clinical practice, an unusual case arose involving a complicated dental surgery, drug therapy, shoplifting and legal action. The patient, a 30-year-old female, was referred to an endodontist for a difficult procedure. Over the span of a few hours, the patient received treatment, was sent back to the referring dentist, and had the involved tooth extracted. While the patient was undergoing these surgeries, several injections of local anesthesia were administered to her.

Within minutes of leaving the dentist's office, the patient went to a store and was charged with shoplifting. The circumstances surrounding this incident, and the final outcome, are described below.

### Patient History

Shortly after her arrival in Canada in 1986, the patient obtained a graduate degree and found employment in her profession. She was a reliable employee and had never experienced medical, psychological or legal problems prior to the shoplifting incident. The patient was not taking any medications at the time, was a non-smoker, physically active, and in excellent health overall. Interestingly, it was suspected that she could have an enzyme deficiency for alcohol dehydrogenase. This suspicion was based on the symptoms observed after the patient had consumed alcohol during a staff party held the previous year.

One relevant finding was that the patient had developed a significant fear of dentists, which was attributed to a traumatic dental experience as a child.

### History of Events

On April 20, 1990, the patient visited the endodontist. When she arrived at the office, the patient expressed deep concern and anxiety, and indicated that she had been very distressed in the days leading up to, and including, the current

appointment. She was clearly apprehensive.

At approximately 10 a.m. on April 20, 1990, a single injection of approximately 80 mg prilocaine (as four per cent solution) was administered to the patient. After removal of extensive dental decay, it was decided that the involved tooth should be extracted, and the patient was sent back to the referring dentist for that procedure. At 3 p.m. on the same day, 3.4 mL of articaine (four per cent with 1:200,000 epinephrine) was administered to the patient for the extraction. Throughout each of the day's procedures, the patient's anxiety was obvious.

Immediately following the extraction, the patient walked approximately three blocks to a local grocery store and purchased a number of items, which were packaged in two heavy plastic bags. The patient reported been very confused, nervous and unhappy, and feeling like she was in a "day dream." She also stated that her heart was pounding and that she had a headache.

The patient left the store carrying the two bags as well as a sport's bag already in her possession. She then walked a short distance to a pharmacy to obtain Tylenol number 3, which was prescribed for her. After some time, while waiting to submit her prescription to the pharmacist, she noticed that she was, in fact, waiting in a post-office line. At this point, the patient, in full view of other shoppers, put the two grocery bags on the floor and proceeded to put a number of store items into her sport's bag.

On realizing that she was in the wrong line, the patient went to the dispensary and had her prescription filled. She paid for the Tylenol number 3 and left the pharmacy. As she did so, she was apprehended by the store's security personnel and charged with shoplifting the items in the sport's bag.

The patient immediately realized what she had done, but claimed that in her confusion she could not explain her actions. She also stated that she had had no intention to shoplift.

### Discussion

During the day of April 20, 1990, the patient received one injection of four per cent prilocaine (without epinephrine) and 3.4 mL of four per cent articaine (with 1:200,000 epinephrine). The medications were administered over a five- to six-hour period.

These anesthetics both belong to the amide class of drugs, and are commonly used in dentistry. Local anesthetics of this type can cause stimulation of the central nervous system (CNS), which may manifest in a number of ways including confusion, dizziness, and disorientation.<sup>1</sup> In addition, these adverse effects appear to be related to the blood concentrations achieved by the drug and, therefore, may be observed more readily after inadvertent administration into the systemic circulation. Furthermore, the amide class of local anesthetics typically has lingering effects, as the half-life of these compounds is generally longer than those in the ester class.

Finally, although epinephrine administration may be associated with several adverse effects including fear, anxiety, nervousness, disorientation, impaired memory and psychotic states,<sup>1,2</sup> it is not clear whether these effects would be observed after the relatively small doses administered to the patient in question. However, the adverse effects associated with epinephrine may be more attributable to endogenously produced epinephrine, as opposed to that of exogenous origin. In fact, as noted in a standard textbook of dental procedures, "... relatively large quantities of epinephrine may be released endogenously, which presents a greater hazard to the patient than the small quantity of epinephrine in the anesthetic solution."<sup>3</sup>

### Conclusion

Considering the patient's history and her fear of dentists, the somewhat lengthy procedures, the repeated administration of local anesthetics and the epinephrine effects (both exogenous



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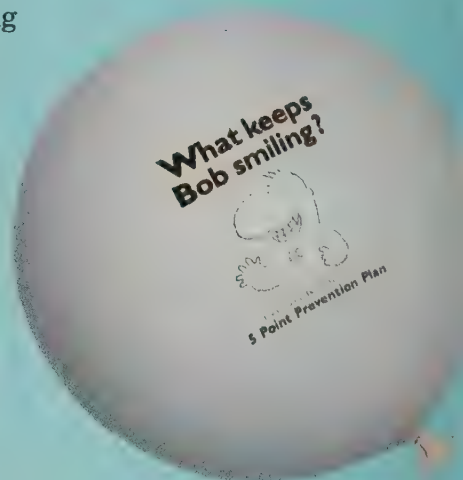
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and endogenous), it seemed reasonable to suggest that the patient's actions could be attributable to the events surrounding the dental procedures. In fact, the day's events may have been directly related to some of the adverse effects reported for either the local anesthesia and/or the epinephrine. Based on the testimony presented in court, the presiding judge agreed that there was, indeed, an element of doubt as to whether the patient intended to shoplift and granted her an absolute discharge.

Although the local anesthetics used in dentistry have an enviable safety record, they are still potent drugs capable of producing adverse effects. It is hoped that this case report might alert all dental practitioners to the possible CNS side effects of these drugs. Patients should be closely monitored for signs and cautioned as to potential problems. In addition, serious consideration should be given to sedative drug therapy for apprehensive patients.

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## Naproxen: Pharmacology and dental therapeutics

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### ABSTRACT

*Naproxen and naproxen sodium are very commonly used and effective non-steroidal anti-inflammatory analgesics. In this paper, they are described and compared, and their pharmacokinetics and indications are discussed. Adverse reactions to these drugs and the mechanism of action of these effects on the gastrointestinal tract, central nervous system, kidneys, liver, and blood are described. A discussion of the effects of the drugs on the elderly and during pregnancy and lactation is included. Also, the allergenicity, miscellaneous rare complications and acute toxicity of the naproxen anion are described, followed by a description of the more common drug interactions.*

*The results of several recent studies that may call into question the current recommendations on using these pharmaceuticals are cited. Until this controversy can be resolved, the practitioner should rely on the principle of "first do no harm" in choosing a course of drug treatment.*

### SOMMAIRE

*Le naproxène et le naproxène sodique sont des antalgiques anti-inflammatoires et non-stéroïdes dont l'usage est très commun et qui sont très efficaces. Dans cet article, on les décrit et on les compare en plus de commenter leur pharmacocinétique et leurs indications. On y décrit également leurs effets contraires ainsi que le mécanisme d'action de ces effets dans le tube digestif, le système nerveux central, les reins, le foie et le sang, y compris leurs effets sur les gens âgés, les femmes enceintes et celles qui allaitent. De plus, on y explique le pouvoir allergisant, les diverses complications rares et la toxicité aiguë du naproxène anionique ainsi que les interactions les plus communes de cette drogue.*

*Enfin, on donne les résultats de différentes études récentes pouvant remettre en question les recommandations*

*actuelles sur l'usage de ces produits pharmaceutiques. Tant que la controverse ne sera pas résolue, on conseille au praticien qui traite un patient avec des drogues d'obéir au principe exigeant d'éviter avant tout de lui faire du tort.*

Naproxen (Naprosyn<sup>®</sup>) and naproxen sodium (Anaprox<sup>®</sup>) are non-steroidal anti-inflammatory analgesics (NSAIDs) which also have an antipyretic effect. Naprosyn was the 14th most prescribed drug in the United States in 1990 and Anaprox was in 91st place.<sup>1</sup> Both drugs are of the propionic acid derivative type, as is ibuprofen. Unlike ibuprofen, however, naproxen has a much longer half-life<sup>2,3</sup> and so can be taken at more convenient six to eight hour time intervals. Naproxen sodium was developed to overcome the slow onset of action of naproxen. The manufacturer states that it reaches peak plasma levels in one to two hours versus the two to four hours required for Naprosyn to do so,<sup>2</sup> although independent studies have indicated that the actual difference in the time required to attain peak plasma levels is not as great as this, and there is a report that both drugs attain onset of analgesia about one hour after administration.<sup>4</sup> Both naproxen and naproxen sodium circulate as the naproxen anion and are metabolized in the liver.<sup>2</sup> Approximately 95 per cent of the dose is excreted in the urine, primarily as naproxen, 6-O-desmethyl naproxen, or their conjugates.<sup>2</sup>

Like all NSAIDs, naproxen exerts its pharmacologic effects by stereoselectively<sup>5,6</sup> inhibiting the enzyme cyclooxygenase, resulting in a reduction in the formation of prostaglandin precursors and thromboxanes from arachidonic acid,<sup>3,7</sup> but beyond this its mode of action is unknown.<sup>2</sup> It is rapidly and completely absorbed from the gastrointestinal tract, and at therapeutic levels it is greater than 99 per cent plasma albumin bound.<sup>2</sup> The drug has generally been

shown to be more effective than ASA, but with fewer adverse reactions, and there is a trend toward better efficacy at higher dosages. Unfortunately, this is accompanied by a greater incidence of side effects.<sup>2,8</sup>

When naproxen was first introduced, the knowledge of the side effects and drug interactions of NSAIDs was not as complete as it is today. The purpose of this paper is to present an overview of the pharmacology, indications for use, adverse effects, and drug interactions of naproxen and to highlight recent research that in some instances seems to contradict the established guidelines for the clinical use of this drug.

### Indications and Dosages

Naproxen is indicated for the treatment of rheumatoid arthritis, osteoarthritis, juvenile arthritis, ankylosing spondylitis, tendonitis, bursitis,<sup>9,10</sup> and acute gout. It is also useful in the treatment of primary dysmenorrhea and the relief of mild to moderate pain.<sup>2,4,11</sup> It is for the latter use that dentists may prescribe this drug. Naproxen's anti-inflammatory and analgesic effects have been consistently shown to be superior to acetylsalicylic acid (ASA) or codeine at the usual therapeutic dose,<sup>3,12</sup> and its use has been recommended following the removal of impacted wisdom teeth.<sup>3,4,11</sup>

In one of the earliest studies of the dental uses of naproxen,<sup>13</sup> Ruedy, at the Montreal General Hospital, showed that 400 mg of naproxen produced a significantly greater analgesic effect than a combination of ASA 325 mg with codeine 30 mg for patients with moderate to severe pain following dental surgery. Similar studies that followed have confirmed the analgesic superiority of naproxen over ASA 650 mg,<sup>14</sup> ASA 1000 mg,<sup>15</sup> paracetamol (acetaminophen) 1,000 mg,<sup>16</sup> and codeine sulphate 60 mg<sup>14</sup> for pain following the extraction of third molars and other oral surgery. Recently, it has been shown



that treatment with naproxen sodium, 550 mg, 30 minutes following the removal of third molars, was just as effective as preoperative administration in controlling postoperative pain.<sup>17</sup>

Because of its strong anti-inflammatory effect and long duration of action, naproxen may be useful in the control of periodontal disease. One placebo controlled study<sup>18</sup> showed that even though naproxen did not suppress the inflammation inducing properties of dental plaque, it did enhance the resolution of gingivitis following prophylaxis. More recently, Jeffcoat et al<sup>19</sup> used digital subtraction radiography to study the effects of naproxen in the treatment of rapidly progressive periodontitis. Patients receiving 500 mg of naproxen twice daily (bid) for three months showed significantly less bone loss and a significant increase in the proportion of teeth demonstrating bone gain than patients in a placebo control group. Although more work needs to be done in this area, it seems that naproxen may have a place as a useful adjunct to scaling and root planing in the treatment of this disease entity.

An extensive search of the literature failed to find any study in which naproxen was used in the treatment of temporomandibular joint disorders. However, its proven effectiveness in patients with rheumatoid arthritis, osteoarthritis, muscle contraction headache, and other musculoskeletal pain, indicates a need for research in this area.

Each 275 mg or 550 mg tablet of naproxen sodium is approximately equivalent to a 250 mg or 500 mg tablet of naproxen, respectively.<sup>4</sup> For the relief of mild to moderate pain of dental origin, the usual initial adult oral dose of naproxen is 500 mg (550 mg of naproxen sodium) followed by 250 mg (275 mg of the sodium salt) every six to eight hours, as necessary. The indications and dosages for chronic naproxen treatment of dental inflammatory conditions (i.e. TMJ disorders or periodontal disease) have not been adequately researched, and the clinical practitioner should approach long-term use of these NSAIDs with caution.

## Adverse Effects

The most common adverse reaction to the chronic use of naproxen is gastrointestinal irritation, which is caused by the drug's interference with the normal protective mechanisms in the stomach. Prostaglandins stimulate the production of cytoprotective mucus and re-

duce gastric acid secretion. When prostaglandin synthesis is inhibited, gastric ulceration, bleeding and perforation can occur, sometimes with no clinical warning signs.<sup>2-4,20,21</sup> To overcome this problem, food, antacid, or sucralfate are often co-administered with naproxen.<sup>22</sup> Food delays absorption, but does not significantly affect the total amount absorbed.<sup>11</sup>

Although the therapeutic effects of naproxen are thought to occur peripherally, the antipyretic effect may occur centrally by decreasing prostaglandin levels in the hypothalamus. Adverse reactions also occur in the central nervous system, including headache, drowsiness, and dizziness.<sup>2,4</sup>

Hypersensitivity reactions to naproxen can occur with a wide variety of manifestations, including urticaria, angioneurotic edema, anaphylactoid reactions, exfoliative dermatitis, and Stevens-Johnson syndrome.<sup>3</sup> The drug is contraindicated in patients with a history of any such reactions to any NSAID or in people in whom ASA or NSAIDs induce the syndrome of asthma, rhinitis and nasal polyps.<sup>2,11</sup>

As previously stated, naproxen is mainly excreted in the urine, both unchanged and as various conjugates.<sup>2</sup> Its adverse effects on the renal system include renal failure, cystitis, hematuria, interstitial nephritis, and nephrotic syndrome.<sup>2,3,23</sup> In renally compromised patients, prostaglandins function to increase renal blood flow and the loss of urinary electrolytes and water. They also counteract the adverse effects that occur when the renin-angiotensin system is stimulated or when catecholamines are released. Without these compensatory mechanisms,<sup>24</sup> adverse reactions to naproxen are more likely to occur.<sup>3,25</sup> The patients at the greatest risk for this reaction are those with impaired renal function, those taking diuretics, and the elderly,<sup>2</sup> although a recent study found that chronic naproxen use (750 mg per day) was not associated with further deterioration of renal function in patients at risk for renal insufficiency.<sup>26</sup>

Naproxen may exhibit an increase in unbound fraction in cirrhotic liver patients, suggesting an increased potential for toxicity in this group. Also, borderline liver function test elevations may occur in about 15 per cent of patients taking naproxen, but severe hepatic reactions are rare.<sup>4,11</sup>

Geriatric patients are reported to be at greater risk for developing adverse hepatic or renal effects from

naproxen,<sup>2,3,11,27</sup> and it has been recommended that practitioners start elderly patients at the lower end of its dose range. However, a comparison of the steady state pharmacokinetics of naproxen in young and elderly healthy individuals, and a summary report of nine clinical trials, showed that advanced age *per se* does not alter the pharmacokinetics of the drug, and that elderly patients demonstrated no consistent decrease in tolerability or increase in toxicity as compared with younger patients.<sup>28,29</sup>

Naproxen can inhibit platelet aggregation and may prolong bleeding time,<sup>4</sup> but the effect is quantitatively less and of shorter duration than that seen with ASA.

Naproxen has not been shown to be teratogenic in animals, but can delay labor if given in the third trimester. It is present in breast milk and may be potentially harmful to babies. The safety of using the drug during pregnancy or lactation has not been proven by well-controlled studies and it should not be used in these cases.<sup>2-4,11</sup>

Other, miscellaneous adverse reactions to naproxen have been described, including ulcerative stomatitis,<sup>4,30</sup> aseptic meningitis,<sup>31</sup> and pseudoporphyria, a reversible bullous photodermatitis (photosensitivity).<sup>32-34</sup>

Acute toxicity can occur and should be treated by gastric lavage and supportive and symptomatic treatment.<sup>4</sup>

## Drug Interactions

As is the case with most pharmaceuticals, naproxen will interact with other drugs to produce generally adverse or unwanted effects. Since it is so highly bound to serum albumin, then, theoretically, other drugs that are also highly bound to serum albumin will either be displaced by the naproxen ion, thus increasing their free levels in the serum, or they will displace the naproxen raising its free concentration. The usual result is systemic toxicity and a more rapid urinary clearance of the unbound drug.<sup>4</sup> Drugs in this category are the oral anticoagulants, hydantoins, salicylates, sulphonamides and sulphonylureas.

Naproxen should therefore be used with caution in patients receiving oral anticoagulants or thrombolytic therapy (e.g. streptokinase) due to the displacement of these drugs from albumin and, thus, their increased concentration. This, in combination with the potential of naproxen for causing gastric bleeding and decreased platelet aggregation,<sup>5</sup> could result in hemorrhage. The con-



comitant administration of naproxen and prednisolone may result in increased concentrations of free prednisolone, with total plasma prednisolone concentrations remaining unchanged.<sup>4</sup>

ASA should not be administered concomitantly with naproxen as the ASA will displace the naproxen from serum albumin.<sup>4</sup> In a clinical study, salicylate reduced the serum concentration of naproxen and increased serum naproxen clearance.<sup>35</sup> The clinical importance of this interaction has not been established, but the combination offers no therapeutic advantage, and may significantly increase the incidence of gastrointestinal effects.<sup>11</sup>

Another drug that increases naproxen serum concentration is probenecid, but by a different method. Rather than displacing the bound antagonist, probenecid may interfere with its plasma clearance by inhibiting the formation of glucuronide conjugates of naproxen.

NSAIDs, including naproxen, may inhibit renal clearance of methotrexate, the chemotherapeutic agent, leading to an increase in blood concentration.<sup>4</sup> This has resulted in four deaths, one of which was caused by naproxen.<sup>11</sup> Lithium levels have also been reported to be elevated by the concomitant use of naproxen, due to the inhibition of renal lithium clearance.<sup>2</sup> Lithium levels should be monitored periodically in a patient taking both drugs.<sup>11</sup>

Naproxen and other NSAIDs can reduce the antihypertensive effects of the  $\beta$ -adrenergic blocking agents,<sup>2,11</sup> and were shown to do so with atenolol but not to a large degree.<sup>36</sup> However, two studies<sup>37,38</sup> showed no elevation of blood pressure by naproxen in patients taking propranolol or other antihypertensives.

In a controlled study in healthy adults and geriatric patients, naproxen caused a decrease in furosemide-induced urine and sodium output in both groups of patients.<sup>4</sup> The antihypertensive effects of this diuretic have also been reported to be blunted by other drugs of this class.<sup>2</sup>

## Conclusion

Despite the rather long list of adverse effects presented here, naproxen is generally well tolerated. If the practitioner selects his or her cases judiciously, this drug can be a very useful tool in the alleviation of pain and inflammation of dental origin. There have been reports<sup>26,28,29,37,38</sup> that would seem to indi-

cate that the recommended guidelines for the use of this drug are slightly too stringent, but the careful practitioner, if he or she must err, should err on the side of prudence.

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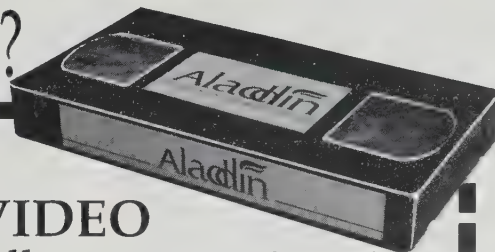
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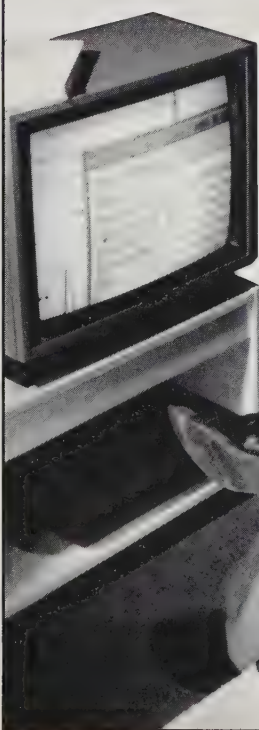
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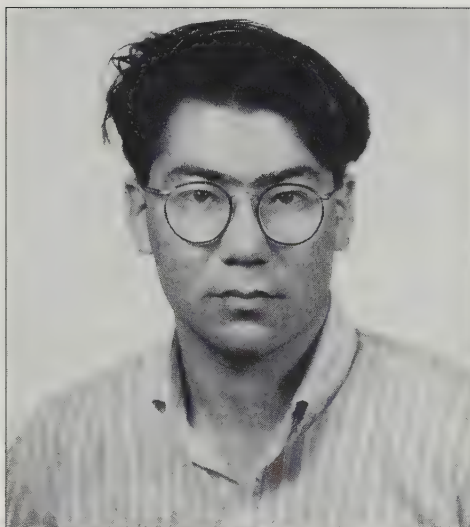
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### Introduction

It has long been thought that successful tooth replantation\* depended upon the preservation of a vital periodontal ligament on the root surface.<sup>1-5</sup> In addition, it has always been taught and recommended that a 20- to 30-minute interval between extraction and replantation was sufficient to preserve the viability of the cells making up the periodontal ligament on the root surface.<sup>6</sup> There is, however, a surprising degree of acellularity of the periodontal ligament 24 hours after replantation, even when replantation occurs within three minutes after extraction. Proye and Polson<sup>7</sup> and Nasjleti et al<sup>8</sup> have shown that the vitality of the periodontal ligament is greatly diminished within 24 hours. What happens between three minutes and 24 hours after an extraction? Does the loss of vitality occur after three minutes, 20 minutes or an hour? When exactly does the process get under way?

A critical analysis of the literature reveals that the results of surgical procedures involving new connective tissue attachment are not easily predictable. The purpose of this paper is there-

fore to determine which factors influence repair and regeneration after replantation.

### Histology and Biology

Ten Cate<sup>9</sup> and Freeman and Ten Cate<sup>10</sup> have suggested that the tissues of the periodontium have a high degree of specificity, which is determined by both their origin and their function – the acellular cementum, periodontal ligament and alveolar bone arise from the follicle, while the fibroblasts of the periodontal ligaments near the cementum are derived from the ectomesenchymal cells of the innervating layer. The fibroblasts near the alveolar bone are derived from the perivascular mesenchyme.

Stahl and Tonna<sup>11</sup> reported a more active matrix formation at the coronally located zones of the periodontal ligament than at the apical zones.

Butler et al<sup>12</sup> have demonstrated that cementum collagen contains considerably less type III collagen than periodontal ligament collagen, which may indicate different modes of biological expression within these tissues. This biological expression determines the re-

generating capabilities of acellular cementum. Generally, the aim of periodontal therapy should be the retention of surgically-exposed acellular cementum and its attached collagen mantle.

Procedures in which teeth are extracted and replaced without intentionally interfering with the vitality of the separated parts of the periodontal ligament adhering to cementum and bone are considered as incised wounds (rather than excised) of the periodontal ligament, as described by Melcher and Eastoe.<sup>13</sup> Linghom and O'Donnell<sup>14</sup> found that when periodontal ligament and bone are excised from the alveolar margin, new periodontal ligament will be constructed adjacent to newly formed bone. New connective tissue attachment involves the regeneration of functionally-oriented principal fibres into newly-formed cementum and alveolar bone.

### Classification of Biological Responses

According to Andreasen and Hjorting-Hansen,<sup>6</sup> three distinct types of resorption phenomena can be identified.



### 1. Surface Resorption

This is defined by the presence of small superficial lacunae in the root cementum and the outermost layers of the dentin, and occurs very often in replanted teeth. Usually, the small cavities are more or less filled by newly formed cementum. According to Karring et al,<sup>15</sup> surface resorption is encountered along the entire root surface, with zones exhibiting replacement resorption alternating with zones of reestablished periodontal ligament.

### 2. Replacement Resorption

This is characterized by a direct contact between the alveolar bone and the root, i.e. ankylosis, and involves a continuous replacement of cementum and dentin with bone tissue. The root becomes resorbed and is eventually replaced by bone tissue in the same way as a non-viable bone transplant. In this case, the cementum and periodontal ligament are replaced by lamellar bone and remodelling of the bone may occur. It is not an incised wound according to the definition of Melcher,<sup>16</sup> and is therefore an excised wound. According to Line et al,<sup>17</sup> root resorption and ankylosis result if parts of a wounded periodontal ligament become repopulated with cells from a source outside the ligament, i.e. the alveolar bone.

### 3. Inflammatory Resorption

This is characterized by the presence of bowl-shaped cavities involving both cementum and dentin adjacent to areas of inflamed periodontal tissue, and occurs when toxic products from a necrotic pulp or bacteria in the pulp cause an inflammatory reaction in the periodontium. According to Karring et al,<sup>15</sup> histological analysis reveals that inflammatory resorption is observed adjacent to inflammatory cell infiltrates seen close to the resected ends of roots. The mechanisms which regulate inflammatory resorption have not yet been elucidated.

Surface resorptions that penetrate the intermediate cementum may develop into inflammatory resorptions and become progressively aggressive because of the toxic influence of the necrotic pulp.<sup>1</sup> This phenomenon occurs more often in the apical area. The diffusion of toxic elements from the pulp via dentinal tubules can induce and maintain the inflammation in the periodontium.<sup>18</sup> There is no definite correlation between the histological appearances of

the pulps and the periodontal ligament. It would seem appropriate to begin a root canal treatment after replantation without trimming the canal at the apex. The integrity of the cementum will thus be protected.

### Literature Review of Relevant Studies

Edwards<sup>4</sup> concluded that if a tooth is replanted before the periodontal ligament cells undergo irreversible degenerative changes, there seems to be no reason why healing and repair should not take place. On the other hand, if the periodontal ligament dies, the fact that a layer of necrotic tissue has to be removed by phagocytosis could retard and sometimes completely prevent reattachment. In such cases, Edwards suggests removing the periodontal ligament before replanting the tooth. Proye and Polson<sup>7</sup> carried out a study in which they extracted and replanted 12 teeth from four monkeys within three minutes. On the first day after replantation, they noticed a break in the continuity of transseptal and periodontal ligament fibres: the ligament was acellular. The ligament was still acellular on day three, but cellular repopulation had begun in the transseptal area. On day 21, cellular repopulation in the transseptal region seemed complete. The periodontal ligament still had acellular areas and some lack of fibre continuity, and repopulation occurred primarily from the adjacent alveolar bone which had enlarged narrow spaces and active osteoclastic resorption. On day 21, the transseptal regions seemed almost complete. Fibre continuity was noted in the periodontal ligament, but normal orientation was absent. The transseptal healing occurred as an incisional wound and was faster than the healing in periodontal ligament, which was dependent on repopulation from the adjacent alveolar bone.

In a study by Loe and Waerhaug,<sup>5</sup> conducted with four monkeys and six dogs, 58 teeth were replanted. Thirteen were placed without periodontal ligament, 15 were dried in air before replantation and 30 were reinserted into the alveolus immediately following extraction. Teeth reinserted without periodontal ligament never regained a normal attachment apparatus; replacement resorption occurred in this event. In the second group (dried air), only minor areas of normal periodontal ligament occurred and only when the drying periods were short. The success rate was

the highest using teeth replanted with a vital periodontal ligament. In the latter group, a follow-up study showed that the periodontal space was of normal width, and the fibres were still partly disorganized 30-80 days post reinsertion, but were functionally oriented after three years. The attached epithelial cuff appeared to return to its pre-extraction level.

Loe and Waerhaug<sup>5</sup> did not report epithelial migration and are in agreement with Hammer and Sacks.<sup>19</sup> Proye and Polson<sup>20</sup> reported epithelial migration along a denuded root surface down to the immediate vicinity of the apical limit of instrumentation. It seems that the initial events determining the ultimate apical extent of the epithelium on the root surface occur very soon after healing has been initiated. We can assume that the healing potential in this situation could not be expressed because the epithelium migrates apically, and becomes interposed between the denuded root surface and the regenerating periodontal connective tissue.

Teeth which have been extracted and quickly replanted or transplanted may therefore heal, with the periodontal ligament eventually returning to its normal morphology. Andreasen<sup>21</sup> also showed that if a tooth is transplanted after a long extra-alveolar period (120 minutes) into a socket with a short post-extraction period (18 minutes), a negative result is obtained. Loe and Waerhaug<sup>5</sup> are also in agreement with Edwards<sup>4</sup> and Blomlof and Otteskog.<sup>22</sup>

Karring et al<sup>15</sup> looked at whether new connective tissue attachment can occur on root surfaces which have been exposed to the oral environment and subsequently implanted into bone tissue. They found a repair phenomenon characterized by root resorption and ankylosis in root surfaces that have been exposed to the oral environment. Where periodontal ligament tissue was preserved following tooth extraction, a functionally-oriented attachment apparatus re-formed. These findings corroborate observations presented by Loe and Waerhaug.<sup>5</sup> It can therefore be assumed that root resorption is a common complication following replantation.

Blomlof et al<sup>3</sup> also demonstrated the importance of preventing the evaporation of tissue fluid from the periodontal ligament if the tooth cannot be replanted immediately. It was suggested that teeth should be kept in saliva, and more specifically in milk, which has a "more suitable osmolality" and is a better storage medium for human peri-



odontal ligament cells.<sup>23</sup> The use of milk would also result in less microbial contamination of the periodontal ligament and pulp tissue.

The auto-transplantation of 40 teeth with partly developed roots in young monkeys produced similar results in a shorter period of time.<sup>24</sup> A normal appearance was obtained less than three months post-operation.

According to Melcher and Eastoe,<sup>13</sup> results from Fong et al,<sup>24</sup> Edwards<sup>4</sup> and Andreasen and Hjorting-Hansen<sup>6</sup> suggest that the cells of the periodontal ligament can heal breaches in the continuity of its fibres, but they seem less able to replace large quantities of damaged ligament.

In a well-designed study, Polson and Caton<sup>25</sup> extracted normal incisors that were either replanted or auto-transplanted. These teeth healed with all the characteristics found in a normal periodontium. The connective tissue attachment level was approximately at its original location. The periodontal ligament areas on the root surfaces of these normal incisors even showed a distinct layer of new cementum after a 40-day period, an observation also described by Linghorn and O'Donnell.<sup>14</sup> In addition, the new cementum apparent on some supracrestal root surfaces was located near the periodontal ligament, confirming the role of periodontal ligament cells in the induction of new cementum.

Andreasen and Kristerson<sup>26</sup> investigated connective tissue auto-transplants as potential periodontal ligament substitutes. The evaluation criterion was whether or not the auto-transplants had the capability of inducing the production of new cementum. Auto-transplanted cutaneous, mucosal connective tissue, periosteum and fascia were all found to partially prevent ankylosis by forming a fibrous barrier between the root surface and the alveolus. There was no new cementum formation because there were no progenitor cells. Gingival connective tissue, dental follicular tissue and periodontal ligament transplants were the only tissues capable of forming a tissue morphologically similar to cementum and of preventing ankylosis.

Listgarten<sup>27</sup> demonstrated that there was a more rapid rate of cementum formation in the apical region. It can be assumed that specific populations of progenitor cells are not responsible for the difference in cementum formation in the supracrestal region as compared to other regions.

According to the results of Proye and

Polson,<sup>7</sup> connective tissue reattachment returns to its original level after the normal root surface has been transplanted into the reduced periodontium. This may indicate that gingival supracrestal connective tissue can retain a potential to unite with attached collagen fibres on a root surface. Periodontal ligament fibre attachment and the supracrestal attachment do not strictly occur at the interface with the root surface but at a distance from the surface, thereby retaining collagen fibres on the root.

Stahl<sup>28</sup> reported that after surgical exposures of cementum, connective tissue reattachment can occur through a linkage between fibre ends on the root surface with fibres from the soft tissue. Loe and Waerhaug<sup>5</sup> have demonstrated the importance of the fibres that remained attached to the root surface following extraction and replantation. This was confirmed by Stahl et al.<sup>29</sup>

As mentioned previously, ankylosis results if regions of a wounded periodontal ligament become repopulated with cells from a source outside the ligament, such as the alveolar bone.<sup>17</sup> Loe and Waerhaug<sup>5</sup> showed that if the wound is repopulated by periodontal ligament cells, regeneration of the periodontal ligament can occur, but if some cells fail to survive transplantation their presence could prevent the migration of ligament cells.

Thus, in a reduced periodontium, the failure to establish a new connective tissue attachment in the remaining part of the coronal portion of a transplanted root is primarily associated with the absence of a periodontal ligament. Listgarten,<sup>27</sup> after detachment of gingival fibres and removal of cementum, found that much of the denuded root becomes covered by epithelium. The presence of epithelial cells extending along the root surface to a level far apical to the crest of alveolar bone in cases of periodontitis-affected root surface, rather than the lack of adjacent progenitor cell populations, inhibits the potential for new connective tissue attachment. Different factors present in reduced periodontium affect the root surface. A periodontitis-affected root surface has been identified as a principal factor in preventing new connective tissue attachment.<sup>25</sup> Other factors include the denudation of fibre attachment,<sup>30</sup> contamination of the root surface,<sup>31-33</sup> and alteration in mineral density.<sup>34</sup> The size of an excised wound involving the epithelium and connective tissue of the gingiva has a direct influence on the rate of healing.<sup>35</sup> Inflamma-

tion is more intense and persistent, and epithelialization appears somewhat delayed with a large wound when compared to a small wound. As mentioned previously, progenitor cells play an important role. One can assume that in the reduced periodontium, such progenitor cells are not available. This may explain the results of Polson and Caton,<sup>25</sup> and may also explain the difficulty experienced in increasing attachment in marginal chronic periodontitis, an observation also reported by Melcher.<sup>36</sup>

When an exposed root surface is transplanted into a normal periodontium, bone resorption occurs. According to Heijl et al,<sup>37</sup> the initiation of bone resorption is in strict relation with the mediators and cell populations associated with the lesion. Polson, Caton and Zander<sup>38</sup> demonstrated that in periodontal repair, cell populations and mediators associated with the lesion are capable of initiating bone resorption and inhibiting bone formation. This is in agreement with the results of Novak, Polson and Freeman,<sup>39</sup> Polson, Novak and Freeman<sup>40</sup> and Heijl et al.<sup>37</sup>

The lack of functional stimulation that is secondary to the destruction of fibre attachment to the root surface may be a component of alveolar bone resorption when exposed root surfaces are transplanted into the normal periodontium.

## Splinting

Nasjleti, Castelli and Caffesse,<sup>41</sup> in a histological study of replanted teeth in monkeys, showed that active resorption processes are far more pronounced in teeth that are splinted for 30 days than in those splinted for seven days. A long-term fixation period does not, therefore, result in better healing than is observed following a short fixation period. These results confirm those of Andreasen and Hjorting-Hansen.<sup>6</sup>

A fixation period of one week after replantation encourages periodontal remodelling and inhibits root resorption and ankylosis; the periodontium repairs rapidly when a shorter splinting time is used.

Andreasen<sup>42</sup> demonstrated that splinting increased the extent and frequency of replacement resorption (ankylosis) in teeth replanted after short extra-alveolar periods, as compared to non-splinted teeth, whereas no difference in periodontal healing occurred between both groups with prolonged extra-alveolar periods. The results indicated that traumatic occlusal



forces could reduce, if not eliminate, the ankylosis found in replanted teeth with short extra-alveolar dry periods.

Excessive movement during the healing of a bone fracture can lead to non-union, with interposition of fibrous tissue, whereas limited function during the healing phase of fractures in the extremities has been shown to enhance bony healing. It may be realistic to hypothesize that similar healing responses could be induced when a replanted tooth is exposed to constant mobility in the healing period after replantation, due to occlusal trauma, as compared to splinted teeth.

Andreasen<sup>43</sup> studied the effect in monkeys of excessive occlusion on periodontal healing after replantation of mature permanent incisors. All of the teeth were replanted 120 minutes after extraction. The animals were then divided into two groups. In one group, the replanted teeth were subjected to normal occlusal forces while in the second group they were subjected to excessive occlusal forces. Eight weeks after replantation and two weeks after the end of the application of the excessive occlusal force, Andreasen noted that:

1. Ankylosis (replacement resorption) occurred at the same frequency in all groups. In previous studies, this type of resorption was found to be the response to severe cell damage.<sup>4,5</sup> According to Andreasen and Kristerson,<sup>26</sup> progressive approximation of bone formed in the socket wall and on the root surface apparently initiated and formed a long union in the entire periodontal membrane space. The technique for extraction was identical for all teeth, cell damage would be limited to the extra-alveolar period.

2. The pattern of ankylosis is different between the two groups.

3. Active ankylosis is more common in the group with no splinting or traumatic occlusion.

4. Linear replacement resorption, a process which apparently removes established ankylosis areas, was significantly more frequent in the non-splinted group than in the other group.

Thus, it can be concluded that excessive occlusal forces cannot prevent or eliminate ankylosis in replanted teeth after prolonged extra-alveolar dry storage.

The results of Nasjleti, Castelli and Caffesse<sup>41</sup> indicate that osteogenesis in the socket is vigorous and the extent of ankylosis cannot be changed to a fibrous union by excessive function. If one can assume that an ankylosed tooth

becomes a part of the universal bone remodelling system (i.e. where Haversian systems undergo resorptive, stopped and rebuilding phases), then increased function of an ankylosed tooth would lead to a change in the remodelling cycle.

## Root Anatomy

According to Blomlof, Lindskog and Hammarstrom,<sup>23</sup> inflammation of the periodontal ligament and inflammatory resorptions seem to be more frequent on the buccal and lingual root surfaces than on the proximal ones. These surfaces (buccal and lingual) are more often traumatized during extraction operations than the others. The permanent root surfaces of extracted and replanted permanent teeth often show a greater degree of resorption.

## Periodontal Ligament

Andreasen<sup>21</sup> demonstrated that the presence of the alveolar part of the periodontal ligament had no influence on periodontal healing.

## Coagulum

The replantation of avulsed matured teeth is not improved by the presence or the removal of the coagulum in the socket.<sup>44</sup>

## Socket

When Andreasen<sup>21</sup> transplanted a tooth 18 minutes after its extraction into a socket from which another tooth had been removed 120 minutes before, he found a greater level of replacement resorption than with auto-transplantation and/or replantation. Thus, it can be assumed that long healing processes are initiated in the socket wall at least 120 minutes after removing the tooth. The time factor also results in an increase in the extent of ankylosis. This is an indirect confirmation that the development of ankylosis after a relatively short extra-alveolar period is more related to the damaged cells of the periodontal ligament on the root surface than to the socket. The development of ankylosis would be due to the healing processes initiated in the socket wall during a long post-extraction period prior to replantation.

## A Realistic Interpretation in Periodontitis

On the basis of the studies reported in the literature, it could be easily con-

cluded that replacement resorption could frequently occur following the treatment of infrabony pockets using new attachment procedures. We know that in a vertical bony defect, the main source for granulation tissue formation is the alveolar bone. On the other hand, in the case of fresh iliac bone transplants used to repair infrabony periodontal defects, granulation tissue formation occurs primarily from the transplant. The protection of the root surface by the apical proliferation of the junctional epithelium may be one reason why replacement resorption only takes place infrequently as a result of new attachment procedures that do not use bone grafts or that use nonvital bone grafts. This contradicts the marketing arguments used to promote these products. In practical terms, the apical proliferation of the junctional epithelium must occur before the proliferation of granulation tissue from the bone. Also, it is possible that gingival and periodontal ligament connective tissue cells, rather than cells coming from the alveolar bone, may fill the wound area adjacent to the root surface. Because granulation tissue from bone has the capability to induce root resorption and ankylosis, the rationale of favoring bone growth with the use of synthetic, xenograft or autograft implants in new attachment procedures is highly questionable.

## Realistic Outlooks in Periodontics

1. In periodontology, we should concentrate on the preservation of a vital periodontal ligament on the root surface. Examples of how this could be done include the use of tissue culture prior to replantation in order to repair the damaged periodontal ligament and the use of periodontal ligament substitutes such as a collagen solution in which the tooth would be placed prior to a replantation.

2. As described previously, the epithelial layer interposed between the alveolar surface lining the periodontal ligament and the root surface prevented connective tissue attachment between tooth and bone surfaces. The long junctional epithelium may not display a periodontal pocket in a non-inflamed state, but the epithelium may well facilitate the passage of microbial products into the underlying connective tissue, and sometimes to the bottom of a previously treated defect. If oral hygiene is inadequate, the sudden occurrence of future defects at the same sites is pos-



sible and will probably occur more rapidly because the biological expression of the previous periodontal ligament is very different from the long junctional epithelium.

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\*as described in the glossary published by the American Academy of Periodontology.

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## Vertical extrusion: Literature review and report of a case

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### ABSTRACT

To date, the scientific literature has documented, primarily, successful methods and techniques of treatment involving vertical extrusion. The purpose of this article is to review the literature and report on a case that demonstrates the multidisciplinary approach required to successfully manage a reversible complication involving the restoration of an adult maxillary central incisor that had sustained an oblique crown-root fracture.

### SOMMAIRE

Jusqu'à ce jour, les écrits scientifiques documentent principalement les techniques et les méthodes qui traitent avec succès les extrusions verticales. Dans cet article, on passe en revue les écrits et le rapport au sujet d'un cas afin de démontrer qu'une approche multidisciplinaire est nécessaire pour bien gérer une complication réversible dans la restauration, chez un adulte, d'une incisive centrale supérieure ayant subi une fracture coronaro-radicaire oblique.

### Introduction

Adjunctive orthodontic treatment is, by definition, tooth movement carried out to facilitate the other dental procedures necessary to control disease and restore function.<sup>1,2</sup> Adjunctive treatment implies limited orthodontic goals involving appliances that are required in only a portion of the dental arch and for only a short time.<sup>2,6</sup> If complications arise during a vertical extrusion procedure, a coordinated treatment plan involving endodontics, orthodontics, periodontics, and prosthetic dentistry may be necessary to successfully restore the tooth.

The purpose of this article is to review the literature and report on a case



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that demonstrates the successful management of a reversible complication involving a traumatically injured maxillary central incisor. The importance of anchorage control and proper force application will be highlighted.

### Review of the Literature

The principles of forced eruption were documented in the dental literature by Angle before 1900. More recently, these principles have been revived in the endodontic literature by Heithersay<sup>7</sup> and in the periodontal literature by Ingber.<sup>8,9</sup> In 1973, Heithersay first proposed the use of orthodontic methods to vertically elevate roots that had horizontal fractures in the cervical third of the root. In 1974, Ingber introduced the technique of orthodontic extrusion as a means of treating carious or fractured non-restorable teeth, as well as for the elimination of one- or two-wall osseous defects.<sup>8</sup> In 1976, Ingber demonstrated the potential of the technique in managing fractures occurring at the gingival margin or below the alveolar crest of bone.<sup>9</sup> In 1978, Simon et al<sup>10</sup> described several examples of

subgingival or subosseous pathologic and traumatic defects that were restored by using endodontics and root extrusion.

The techniques used for tooth extrusion have included:

- 1. Full or partial intra-arch direct-bonding of orthodontic brackets and archwires.<sup>2,6,11</sup>
- 2. Using brackets, or direct bonding a sectional wire to abutment teeth.<sup>9,10,11,13-15</sup>
- 3. Treatment with removable appliances.<sup>16,20</sup>
- 4. Inter (cross) arch direct-bonding.<sup>21, 24</sup> Orthodontic extrusion of single-rooted teeth raises the root one to six millimetres out of the alveolus.<sup>8,12,25</sup> Conventional orthodontic bands, direct-bond brackets, archwires, elastics, and removable appliance systems provide versatile attachments from which a vertical force is then exerted on the root.<sup>12,26</sup> The extrusion movement can take place rapidly (in weeks), or slowly (in months), but the orthodontic force required must not exceed 25 to 30 grams, in order to avoid the risk of root resorption.<sup>2,4,27,29</sup> On completion of the extrusion movement, a period of stabilization allows for socket healing, bone maturation and dentogingival fibre reorganization.<sup>2,3,30</sup> In 1982, Lemon<sup>31</sup> stated that one month of stabilization is recommended per millimetre of extrusion. Therefore, a root extruded three mm requires a stabilization period of three months; four mm requires four months, etc.<sup>31</sup>

Vertical extrusion can be used to improve access for the repair of external resorption defects, subgingival or subosseous caries, isolated periodontal defects, crown-root fractures and perforations. Easier rubber dam clamp adaptation, for root canal therapy, can also be realized. Furthermore, if immediate extraction in a medically compromised patient would lead to osteoradionecrosis, extrusion of the roots is the atraumatic treatment of choice.<sup>12</sup>





**Fig. 1:** Fractured maxillary right central incisor. The exposed pulp had been covered with calcium hydroxide and immediate restorative material.



**Fig. 2:** Facial view of fractured tooth in maximum intercuspation. Note the position of the gingival margin.

## Case Report

A 22-year-old black male presented for treatment of a maxillary right central incisor that had sustained an oblique crown-root fracture. His medical history demonstrated no contraindications to dental therapy. The clinical examination revealed isolated areas of bleeding on probing, fair to good plaque control, and generalized two to three mm interproximal probing depths. The gingiva was pink, mildly pigmented, firmly bound to the underlying structures and well stippled. Knife-edged margins, regular contours and an adequate band of keratinized gingiva were also noted. Plaque and calculus were slight. Defective restorations, evident clinically and radiographically, were located on the mesial surfaces of the teeth adjacent to the fractured tooth. The patient indicated that no diastemas had existed in the anterior maxillary segment. Calcium hydroxide (Dycal, L.D. Caulk) liner and an immediate restorative material (IRM, L.D. Caulk) had been placed on the exposed pulp (Fig. 1). No other injuries were present and radiographic examination revealed no additional dental or alveolar fractures.

The patient's chief complaints were esthetic and restorative: "I would like



**Fig. 3:** Orthodontic extrusion was initiated by a two-segment elastic ligature wrapped around 0.016 x 0.022 stainless steel archwire.



**Fig. 4:** Four days after the start of extrusion, vertical movement was continued using only one segment of the elastic ligature.

root canal treatment and a crown placed." He understood that the treatment plan would involve endodontic, orthodontic, periodontic, restorative and fixed prosthetic procedures (Fig. 2). The prognosis was considered good.

After endodontic therapy, orthodontic extrusion was initiated. This treatment moved the apical extent of the fracture line to a more favorable position for the restoration of the tooth crown.

Orthodontic brackets were placed in the middle third of the two abutment teeth on each side of the tooth to be extruded. A bracket was placed in the apical third of the fractured crown. A two-segment elastic ligature was wrapped around a straight segment of .016 x .022 stainless steel archwire (Fig. 3). The patient was seen four days later, at which time one segment was removed and the remainder of the elastic ligature was wrapped around the archwire to engage the bracket (Fig. 4).

After only four days, the extrusive forces had brought the wings of the bracket in contact with the archwire. An occlusal offset bend was placed in a new rectangular archwire to give additional clearance for the erupting bracket. To maintain the space for the extruding tooth and to prevent the adjacent teeth



**Fig. 5:** To help provide clearance for the extruding tooth and bracket, an occlusal offset bend was placed in the rectangular archwire. To counteract tipping of the adjacent teeth toward the tooth being extruded, a segment of open coil spring was placed on the archwire.



**Fig. 6:** After approximately three mm of extrusion, the straight rectangular archwire was repositioned to begin the period of stabilization. The tooth was restored with a hybrid composite resin. Note the coronal position of the gingival margin.

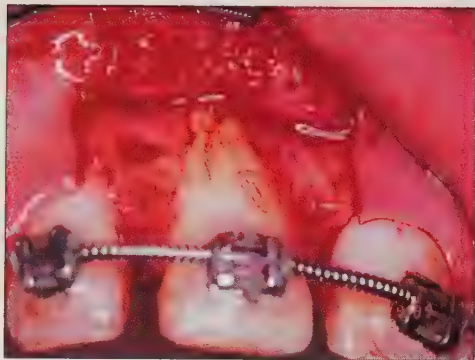


**Fig. 7:** Radiographic appearance of the tooth and bone after two weeks of extrusion.

from moving mesially, a segment of open coil spring (0.009 in, 0.23 mm) was placed on the archwire (Fig. 5).

The patient was seen every three





**Fig. 8:** Osseous dehiscence on the right central incisor.



**Fig. 9:** Upon reflecting the palatal tissue, the full extent of the oblique fracture could be seen. The palatal alveolar crestal bone was recontoured.

days. Approximately three mm of extrusion was accomplished in two weeks. The straight segment of rectangular archwire, used when treatment began, was placed into the brackets of the extruded tooth and the adjacent teeth. The fractured incisor was restored with a hybrid composite resin (Prisma, APH, L.D. Caulk), adjusted, polished, and radiographed to monitor changes in appearance of the root and periodontal ligament space (Figs. 6 and 7).

Periodontal surgery was performed to remodel the gingival tissue and both the interproximal and palatal alveolar crestal bone levels. Incisions were placed in the sulcus of the adjacent teeth. And inverse bevel scalloped incision was used on the facial and palatal surface of the extruded tooth so that full thickness flaps could be reflected.

Facially, the tooth showed evidence of a bony dehiscence (Fig. 8). Palatally, the subgingival fracture ended just above the alveolar crest of bone (Fig. 9).



**Fig. 10:** A parallel-sided prefabricated post was luted after completion of vertical extrusion. This assisted the retention of a core to restore the missing clinical crown.



**Fig. 11:** Vertical extrusion allowed the placement of crown margins on sound tooth structure.

Osseous resection successfully exposed an adequate amount of supracrestal tooth structure. The apically positioned flaps adjusted the gingival contour to that of the adjacent teeth.

Four weeks after periodontal surgery, the tooth was treated with a prefabricated post (Para-Post Plus, Whaledent), a composite resin core was prepared, an impression made, and a full coverage provisional restoration was placed (Figs. 10, 11, 12). Six weeks later, a procedure to reverse the iatrogenically created diastema, labial flaring, and increased horizontal overlap was begun. Space closure was initiated with a multiple unit (chain) elastomeric ligature (Alastic, Unitek/3M) (Fig. 13).

Three months of postsurgical healing was uneventful, and a porcelain-fused-to-metal crown was placed. A post-stabilization radiograph showed the favorable architecture of the mesial crestal bone, and the adequate crown-to-root ratio (Fig. 14). To assist the retention of the closed diastema, a maxillary Hawley retainer was inserted (Fig. 15).

Although a marginal inflammation was evident from crown cementation procedures, a one mm probing depth surrounded the tooth (Fig. 16). The final results met with the patient's approval.



**Fig. 12:** A provisional restoration was placed in the presence of a more uniform gingival contour.



**Fig. 13:** Placement of the chain elastomeric ligature to retract the flared incisors.

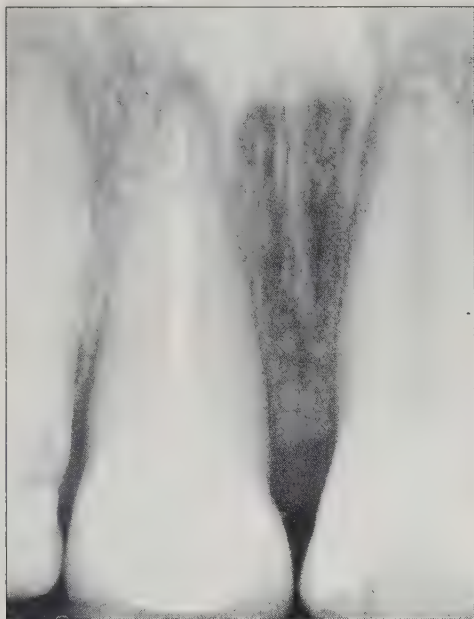
## Discussion

Most problems associated with adult tooth movement can be avoided. To undertake tooth movement without considering potential complications is to invite problems.<sup>32</sup>

An open-space coil spring can be considered an example of a metallic, elastic storage component. Tension coils (closed coils) operate to close spaces. Compression coils (open coils) operate to open spaces. When placed on an archwire, the open coil is activated by compressing it, and this energy is then available for gradual release to stimulate tooth movement.<sup>33</sup> As demonstrated in the case report, the novice is likely to utilize too much force when using coil springs. It is wise to use coil springs of the smallest diameter wire (about 0.15 mm) and to compress the spring no more than one-fourth of its relaxed length.<sup>26</sup>

If an open-coil spring is used in the anterior segment of the arch, the posterior ends of the archwire must be crimped, bent or securely ligated to prevent slippage of the wire in the bracket slots. If these techniques are neglected, the consequence is labial flaring of the anterior teeth. Furthermore, the open-coil springs must not be left in position





**Fig. 14:** The post-stabilization radiograph reveals a restored tooth with a very favorable crown-to-root ratio.

for too long a period of time. In the case reported, this situation contributed to anterior arch expansion, diastema creation, and the labial flaring of the extruded incisor and adjacent teeth.

## Summary

Optimal force application and control of anchorage are some of the principles that must be given adequate consideration when planning vertical extrusion procedures. Before starting treatment, understand and anticipate potential difficulties that could be encountered as a result of the specific treatment method you have selected. This strategy will facilitate the reestablishment of a functional and stable dentition.

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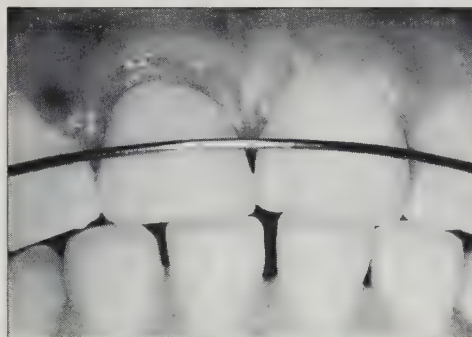
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The views expressed herein are those of the authors and do not necessarily reflect the policies of the U.S. Army or the Department of Defense.

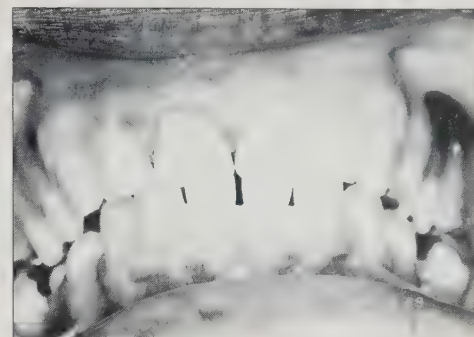
Reprint requests to Dr. Headley.



**Fig. 15:** A Hawley retainer was provided to stabilize the flared incisors.

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**Fig. 16:** Final result. Some marginal inflammation is evident from the cementation procedure.

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## Résistance adhésive entre une base au verre ionomère photopolymérisable (Vitre-Bond) et une résine composite (P 50)

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### SOMMAIRE

*Cette étude tente d'évaluer la résistance adhésive entre le VitreBond et la résine composite P-50 lorsque le VitreBond est soumis au fraisage et à l'application de Scotchprep. Les résultats obtenus indiquent que cette adhésion est supérieure à la résistance cohésive du VitreBond indépendamment du fraisage et de l'application du Scotchprep.*

### ABSTRACT

*This study attempts to measure the adhesive resistance between VitreBond and P-50 composite resin when the VitreBond surface is submitted to grinding and to the application of Scotchprep. The results indicate that this adhesion is superior to the cohesive resistance of VitreBond independently from grinding and from the application of Scotchprep.*

### Introduction

L'aspect esthétique des dents postérieures de leur restauration prend une importance grandissante dans la pratique dentaire de tous les jours. Ces matériaux de restauration ne sont pas cependant que des matériaux esthétiques car ils possèdent aussi la propriété d'adhérer aux structures dentaires. La résistance adhésive à l'émail des résines composites directes est maintenant bien reconnue alors que l'adhésion à la dentine demeure un sujet beaucoup plus délicat. On peut cependant simplifier les résultats obtenus au chapitre de l'adhésion à la dentine en formant deux groupes d'adhésifs: les ciments de verre ionomère et les résines dentinaires.

Les ciments de verre ionomère présentent une adhésion à la dentine relativement faible (3-5 MPa) comparativement à l'adhésion obtenue par les

résines dentinaire (10-15 MPa). Ces mêmes résines dentinaires montrent une adhésion encore plus grande à l'émail mordancé (20-21 MPa). Par contre, l'adhésion à la dentine des ciments au verre ionomère serait plus durable que celle obtenue par les résines dentinaires.<sup>1</sup> Toutefois cette adhésion des verres ionomères se développe beaucoup plus lentement que celle des résines dentinaires, à l'exception d'un nouveau type de verre ionomère dont la capacité d'adhésion à la dentine est non seulement immédiate mais aussi plus élevée que celle des ionomères conventionnels.<sup>2-6</sup> Ce nouveau type de verre ionomère (VitreBond) semble donc joindre le meilleur des deux mondes: l'adhésion immédiate par la présence de l'adhésif de type résine qui y est inclus et la pérennité adhésive par sa phase verre ionomère. On peut imaginer facilement que l'adhésion soit au départ assurée par la portion résine alors que dans le temps elle le soit par la portion verre ionomère. Cette adhésion immédiate présente l'avantage de permettre une résistance aux tensions engendrées par la contraction de prise des résines composites.

Si cette assertion est vraie et que l'adhésion des résines composites à ce nouveau type de base équivaut à la résistance cohésive des matériaux en présence, on approche alors d'un système où la résistance cohésive totale pourra permettre non seulement une plus grande homogénéité de la résistance totale mais aussi une étanchéité supérieure du complexe dent/base/obturation. Un système adhésif est aussi bon que son chaînon le plus faible. On sait l'adhésion des résines composites à l'émail mordancé. On sait l'adhésion des bases de type VitreBond à la dentine.<sup>7-12</sup> On sait par contre bien peu de choses sur l'adhésion entre ce type de base et la résine composite.

Cette étude vise à évaluer l'adhésion d'une résine composite pho-

topolymérisable (P-50) à ce nouveau type de base photopolymérisable et à évaluer l'influence de l'usage du Scotchprep et du fraisage sur les capacités adhésives de la résine composite au VitreBond.

En fait, certaines questions demeurent sans réponse:

- Quelle est l'influence du Scotchprep sur l'adhésion d'une résine composite au VitreBond?
- Quelle est l'influence d'une altération de la surface du VitreBond avec une fraise diamantée sur les capacités adhésives du VitreBond à la résine composite (P-50)?
- Existe-t-il une interaction entre la préparation du VitreBond et l'usage de Scotchprep sur l'adhésion de la résine au VitreBond?

Cette étude tente de répondre à ces questions.

### Matériel et méthode

#### Préparation des échantillons

Des cavités rétentrices d'un diamètre de 5 mm et d'une profondeur de 2 mm ont été taillées dans des blocs d'aluminium (Fig. 1). Le VitreBond\* a été malaxé et placé dans ces cavités selon le mode d'emploi suggéré par le manufacturier. La photo-polymérisation est accomplie par 3 expositions de 40 secondes à la lumière visible\*\* en 3 reprises durant l'insertion du matériau. Trois malaxages distincts sont nécessaires pour combler une cavité. La dernière addition est faite pour les groupes 1 et 2 de façon à obtenir une surface qui soit la plus plane possible sans utiliser d'artifice tel une plaque ou une lamelle de verre pour y arriver (Fig. 2). La dernière addition pour les groupes 3 et 4 est faite pour obtenir un excès de VitreBond (Fig. 3) qui sera taillé avec une fraise diamantée.\*\*\*

Des matrices en polysiloxane\*\*\*\* de dimensions standardisées (anneaux





Figure 1: Cavité préparée dans un bloc d'aluminium.

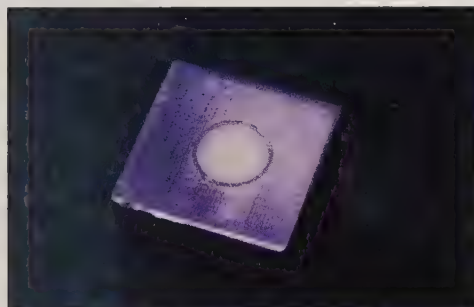


Figure 2: Préparation du VitreBond pour les groupes 1 et 2.

cylindriques d'une mesure intérieure de 3 mm de diamètre sur 6 mm de haut) (Fig. 4) sont montés à l'aide de cire collante sur la surface des échantillons de VitreBond servant ainsi de moule à l'insertion de la résine composite. Dix échantillons ont été préparés pour chacun des groupes mais un échantillon du groupe 1 a été perdu par fracture avant le test de cisaillement.

Deux variables indépendantes sont soumises à l'étude: le Scotchprep et la préparation par fraisage du VitreBond. Les groupes d'échantillons suivants ont été réalisés avec le VitreBond:

Groupe 1) Sans fraisage de la surface et sans Scotchprep,  
Groupe 2) Sans fraisage de la surface et avec Scotchprep,  
Groupe 3) Avec fraisage de la surface et sans Scotchprep,  
Groupe 4) Avec fraisage de la surface et avec Scotchprep.

Chacun des quatre groupes ont ensuite reçu la résine ScotchBond2 et la résine composite P-50.<sup>8</sup>

*Groupe 1: VitreBond sans fraisage, sans Scotchprep, avec résine ScotchBond2 et P-50.*

Les surfaces de VitreBond sont enduites d'une couche de résine ScotchBond2 et exposées à la lumière durant 20 secondes. Les moules de polysiloxane sont placés sur ces surfaces et y sont maintenus par de la cire collante. Les moules sont remplis de résine P-50 en trois additions successives de 2 mm suivies d'expositions de 40 secondes à

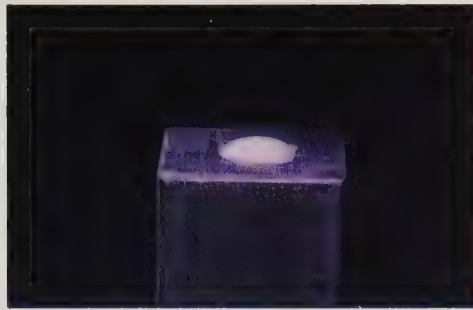


Figure 3: Préparation du VitreBond avant fraisage pour les groupes 3 et 4.

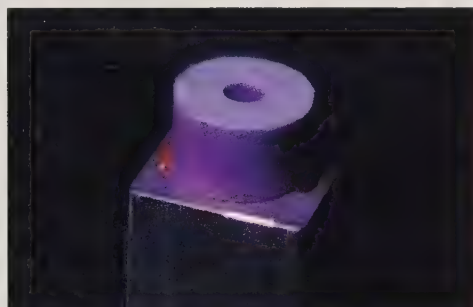


Figure 4: Matrice de polysiloxane montée sur un bloc d'aluminium.

la lumière visible pour une exposition de 120 secondes. Les moules sont coupés à l'aide d'un bistouri et enlevés. Les échantillons sont soumis finalement à deux expositions de 40 secondes à la lumière visible à angle de 45° (Fig. 5) sur deux côtés opposés du cylindre en direction de la jonction résine composite/VitreBond.

*Groupe 2: VitreBond sans fraisage, avec Scotchprep (30 sec.), résine ScotchBond2 et P-50.*

Les surfaces de VitreBond sont traitées avec le Scotchprep pour une période de 30 secondes puis asséchés. Ces surfaces sont ensuite traitées selon la méthode utilisée pour le groupe 1.

*Groupe 3: VitreBond avec fraisage de sa surface, sans Scotchprep, avec résine ScotchBond2 et P-50.*

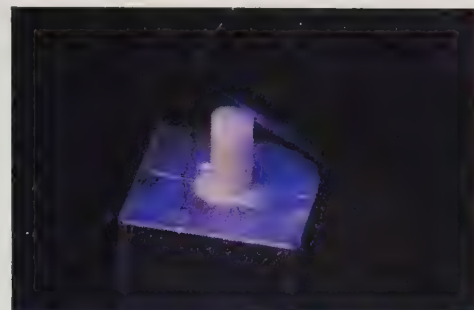


Figure 5: Echantillon monté pour l'appareil Instron.

La surface de ces échantillons est meulée à haute vitesse avec une fraise diamantée et sans l'eau pour obtenir une surface plane. Ces surfaces sont ensuite traitées comme pour le groupe 1.

*Groupe 4: VitreBond avec fraisage de sa surface, avec Scotchprep (30 sec.), résine ScotchBond2 et P-50.*

La surface de ces échantillons est meulée à haute vitesse avec une fraise diamantée et sans l'eau pour obtenir une surface plane. Ces surfaces sont ensuite traitées comme pour le groupe 2.

Tous les échantillons sont conservés dans de l'eau distillée dans une étuve à 37°C durant 20 heures avant l'épreuve de résistance mécanique pour permettre l'absorption d'eau.

## Épreuve de Résistance au Cisaillement

Tous les échantillons sont soumis à l'épreuve de cisaillement sur un appareil Instron<sup>88</sup> à une vitesse de 2 mm par minute. La résistance au cisaillement est enregistrée par une imprimante sur papier à entraînement à une vitesse de 5 pouces par minute.

## Resultats

Les résistances adhésives moyennes et leur écart type sont rapportés au Tableau I. En plus de l'échantillon du groupe

## Tableau I

### Résistance adhésive moyenne

|                                | psi         | kg/cm <sup>2</sup> | MPa          |
|--------------------------------|-------------|--------------------|--------------|
| Groupe 1                       |             |                    |              |
| Sans fraisage/sans Scotchprep  | 2 867 (400) | 201,68 (28,19)     | 19,77 (2,76) |
| Groupe 2                       |             |                    |              |
| Sans fraisage/avec Scotchprep  | 3 091 (341) | 217,42 (24,04)     | 21,32 (2,36) |
| Groupe 3                       |             |                    |              |
| Avec fraisage/sans Scotchprep  | 2 733 (458) | 192,25 (32,25)     | 18,85 (3,16) |
| Groupe 4                       |             |                    |              |
| Avec fraisage/avec Scotchprep  | 3 294 (343) | 231,66 (24,13)     | 22,71 (2,37) |
| (écart type entre parenthèses) |             |                    |              |





Figure 6: Exemple d'échantillon fracturé dans le VitreBond.

1 perdu avant l'obtention de sa résistance adhésive, un échantillon du groupe trois a été rejeté car sa valeur était totalement hors de proportion avec les autres données de ce groupe. Les groupes 1 et 3 avaient donc 9 échantillons et les groupes 2 et 4 avaient 10 échantillons pour un nombre total de 38.

### Analyse du mode de fracture

Le mode de fracture indique si le bris s'effectue dans le VitreBond (fracture cohésive), dans la résine composite P-50 (fracture cohésive) ou à la jonction du VitreBond avec la résine composite (fracture adhésive). L'analyse révèle que 36 des 38 échantillons se sont brisés dans le corps même du VitreBond (Fig. 6) alors que deux échantillons ont présenté des fractures de type mixte, à la fois dans le VitreBond et à l'interface VitreBond/résine composite. C'est donc dire que la résistance mesurée équivaut à la résistance cohésive du VitreBond. Dans ces conditions, nous ne pouvons poursuivre l'analyse des différents groupes en présence. Nous ne pouvons que jumeler ces groupes pour obtenir la moyenne de la résistance cohésive du VitreBond. Cette résistance cohésive moyenne est de l'ordre de 20,7 MPa ( $\pm 2,9$ ) (Tableau II). Ce qui est une valeur du même ordre que la résistance adhésive des résines dentinaires à l'émail mordancé.

### Discussion

Il est intéressant de noter que le meulage du VitreBond expose des particules inorganiques laissant ainsi une surface exposant moins de matrice résineuse disponible pour l'adhésion; pourtant ceci ne diminue pas la résistance adhésive en deçà de la résistance des résines à l'émail mordancé. C'est donc dire que la résistance cohésive du VitreBond est moindre que la résistance cohésive de la résine composite et que la résistance adhésive entre le Vitre-

## Tableau II

### Résistance cohésive du VitreBond

|                                  | psi         | kg/cm <sup>2</sup> | MPa        |
|----------------------------------|-------------|--------------------|------------|
| Résistance cohésive du VitreBond | 3 007 (429) | 211 (30,2)         | 20,7 (2,9) |
| (écart type entre parenthèses)   |             |                    |            |

Bond et la résine composite demeure comparable à la résistance adhésive des résines dentinaires à l'émail mordancé.

### Conclusion

Cette étude ne peut donc répondre aux questions de départ car la fracture cohésive du VitreBond nous empêche d'y répondre. Par contre, cette résistance cohésive «élevée,» puisqu'elle équivaut à la résistance des résines composites à l'émail mordancé, diminue grandement l'importance de ces questions. Le maillon le plus faible de la chaîne adhésive demeure donc l'adhésion avec la dentine même si cette situation est grandement améliorée par l'usage d'une base pouvant rapidement gagner ses propriétés adhésives.

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Cette étude a été réalisée grâce au fonds interne de la faculté. Les auteurs tiennent à remercier M<sup>me</sup> Hélène Labrèche et le D<sup>r</sup> Gilles Lavigne pour leur aide dans la réalisation de ce projet.

Les demandes de tirés-à-part peuvent être adressées au D<sup>r</sup> André Prévost, Faculté de Médecine Dentaire, Université de Montréal, C.P. 6128, Succursale A, Montréal, Québec, H3C 3J7.

\*VitreBond, Batch No. 9RW8, 3M Dental Products Division, 3M Canada Inc., Post Office Box 5757, London, Ontario, Canada N6A 4T1.

\*\*Visilux II, 3M Dental Products Division, 3M Canada Inc., Post Office Box 5757, London, Ontario, Canada N6A 4T1.

\*\*\*Fraise diamantée No. 6845/014, Braseler Canada Inc., 4755 Van Horne, suite 105, Montréal, Québec, Canada H3W 1H8.

\*\*\*\*Hydrosil, Matériau d'empreinte à base de polysiloxane. Caulk, Milford, Delaware, 19963. Diamètre du moule: 3mm; pour une

telle surface, une résistance au déchirement de 1 kg = 202 Psi.

<sup>§</sup>P-50, Batch No. 9CH2D, 3M Dental Products Division, 3M Canada Inc., Post Office Box 5757, London, Ontario, Canada N6A 4T1.

<sup>§§</sup>Appareil Instron, Model 4201, Instron Corporation, Canton, Massachusetts 02021.

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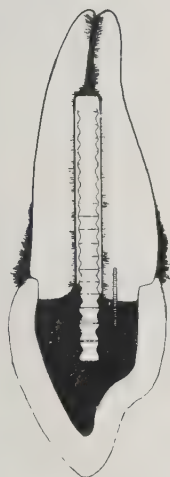
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### THERAPEUTIC CLASSIFICATION

Analgesic Agent

### ACTION

Toradol (ketorolac tromethamine) is a non-steroidal anti-inflammatory drug that exhibits analgesic activity. Its mode of action is to inhibit the cyclo-oxygenase enzyme system, thereby inhibiting the synthesis of prostaglandins, and is considered to be a peripherally acting analgesic. At analgesic doses it has minimal anti-inflammatory and antipyretic activity.

Ketorolac tromethamine is rapidly and completely absorbed when administered by both the oral and intramuscular routes, and pharmacokinetics are linear following single and multiple dosing.

Steady state plasma levels are attained after one day of Q.I.D. dosing. Based only on pharmacokinetic principles, a faster attainment of the steady state plasma level might be achieved with a loading dose of about twice the maintenance dose. This occurs when the dosing interval is approximately equal to the drug's half-life.

Following oral administration, peak plasma concentrations of 0.52 to 1.31 mcg/ml occurred 35 minutes after a single 10 mg dose. The terminal plasma elimination half-life ranged between 4.1 and 6.1 hours in healthy adults, while in elderly subjects (mean age: 72 years) it ranged between 3.0 and 6.1 hours. A high fat diet decreased the rate but not the extent of absorption of oral ketorolac tromethamine, while antacid had no effect.

Following intramuscular administration, peak plasma concentrations of 2.2 to 3.0 mcg/ml occurred an average of 50 minutes after a single 30 mg dose. The terminal plasma half-life ranged between 3.8 and 6.3 hours in young adults and between 4.4 and 8.6 hours in elderly subjects (mean age: 72).

The primary route of excretion of ketorolac tromethamine and its metabolites (conjugates and the p-hydroxy metabolite) is in the urine (91.4%) and the remainder is excreted in the feces.

More than 99% of the ketorolac in plasma is protein bound over a wide concentration range.

### INDICATIONS

Orally administered Toradol (ketorolac tromethamine) is indicated for the short-term management of mild to moderately severe pain, including post-surgical pain (such as general, orthopedic and dental surgery), acute musculoskeletal trauma pain and post-partum uterine cramping pain.

Intramuscular injection of Toradol is indicated for the short-term management of moderate to severe pain, including pain following major abdominal, orthopedic and gynecological operative procedures.

### CONTRAINDICATIONS

Toradol (ketorolac tromethamine) should not be used where there is a known or suspected hypersensitivity to the drug. Because of the possibility of cross-sensitivity, ketorolac tromethamine should not be used in patients in whom acetylsalicylic acid (ASA) or other non-steroidal anti-inflammatory agents induce acute asthmatic attacks, urticaria, rhinitis or other allergic manifestations. Fatal anaphylactoid reactions may occur in such individuals.

Toradol (ketorolac tromethamine) also should not be used in patients with peptic ulcer or active inflammatory disease of the gastrointestinal system.

### WARNINGS

Long-term administration of ketorolac tromethamine oral formulation has shown that this drug shares the risks that other non-steroidal anti-inflammatory drugs pose to patients when taken chronically. Peptic ulceration, perforation and gastrointestinal bleeding, sometimes severe and occasionally fatal have been reported during therapy with non-steroidal anti-inflammatory drugs and may occur with ketorolac tromethamine, both in the presence or absence of previous symptoms. Elderly and debilitated individuals are most susceptible to these complications, the incidence of which increases with dose and duration of treatment. Close medical supervision is recommended in patients prone to gastrointestinal tract irritation, particularly those with a history of peptic ulcer, diverticulosis or other inflammatory disease of the gastrointestinal tract. In these cases the physician must weigh the benefits of treatment against the possible hazards.

Patients taking any non-steroidal anti-inflammatory drug including ketorolac tromethamine should be instructed to contact a physician immediately if they experience symptoms or signs suggestive of peptic ulceration or gastrointestinal bleeding. These reactions can occur at any time during the treatment. If peptic ulceration is suspected or confirmed, or if gastrointestinal bleeding occurs, ketorolac tromethamine should be discontinued and appropriate treatment instituted and the patient closely monitored.

Ketorolac tromethamine is not recommended for routine use with other non-steroidal anti-inflammatory drugs because of the potential for additive side effects.

**Use in pregnancy, lactation and labour:** The administration of ketorolac tromethamine is not recommended during pregnancy or lactation.

Ketorolac tromethamine is not recommended for use as an obstetrical preoperative medication or for obstetrical analgesia because of the known effects of non-steroidal anti-inflammatory drugs on uterine contraction and fetal circulation.

**Use in children:** Safety and efficacy in children have not been established. Therefore, Toradol is not recommended for use in children under age 16.

**Use in the elderly:** Because ketorolac is cleared somewhat more slowly by the elderly (See PHARMACOKINETICS) who are also more sensitive to the renal effects of non-steroidal anti-inflammatory drugs, extra caution and the lowest effective dose should be used.

### PRECAUTIONS

**Renal effects:** As with other drugs that inhibit prostaglandin biosynthesis, elevations of blood urea nitrogen (BUN) and creatinine have been reported in clinical trials with ketorolac tromethamine. Since ketorolac tromethamine and its metabolites are excreted primarily by the kidney, patients with significant impairment of renal function (serum creatinine values greater than 5 mg/dL) should not receive ketorolac tromethamine unless the expected benefits outweigh the risks. In patients with moderately impaired renal function serum creatinine values ranging from 1.9 to 5.0 mg/dL, the rate of ketorolac clearance was reduced to approximately half of normal. The total daily dose of ketorolac tromethamine should be reduced by half in such patients. The disposition of ketorolac in dialysis patients has not been studied.

Patients who are volume depleted because of blood loss or severe dehydration may be dependent on renal prostaglandin production to maintain renal perfusion and therefore glomerular filtration rate. In such situations the use of drugs which inhibit prostaglandin synthesis might be expected to further decrease renal blood flow. Caution is advised if ketorolac tromethamine is used in such circumstances. Close monitoring of urine output, serum urea and serum creatinine is recommended until the patient is normovolemic.

**Hepatic effects:** Meaningful elevations (greater than 3 times normal) of serum transaminases (glutamate pyruvate (SGPT or ALT) and glutamic oxalacetic (SGOT or AST)) occurred in controlled clinical trials in less than 1% of patients. If clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur (e.g., eosinophilia, rash, etc.), ketorolac tromethamine should be discontinued. Patients with impaired hepatic function from cirrhosis do not have any clinically important changes in ketorolac tromethamine clearance. Studies in patients with active hepatitis or cholestasis have not been performed.

**Fluid and electrolyte balance:** Fluid retention and edema have been observed in patients treated with Toradol. Therefore, as with many other non-steroidal anti-inflammatory drugs, the possibility of precipitating congestive heart failure in elderly patients or those with compromised cardiac function should be borne in mind. Toradol should be used with caution in patients with cardiac decompensation, hypertension or other conditions predisposing to fluid retention.

**Hematologic effects:** Ketorolac tromethamine inhibits platelet function and may prolong bleeding time. It does not affect platelet count, prothrombin time (PT) or partial thromboplastin time (PTT). Patients who have coagulation disorders or are receiving drug therapy that interferes with hemostasis should be carefully observed when ketorolac tromethamine is administered. Unlike the prolonged effects from aspirin, the inhibition of platelet function by ketorolac tromethamine is normalized within 24 to 48 hours after the drug is discontinued.

Blood dyscrasias associated with the use of non-steroidal anti-inflammatory drugs are rare, but could occur with severe consequences.

**Infection:** In common with other anti-inflammatory drugs, ketorolac tromethamine may mask the usual signs of infection.

**Drug Interactions:** Toradol (ketorolac tromethamine) is highly bound to human plasma protein (mean 99.2%) and binding is independent of concentration.

Prothrombin time should be carefully monitored in all patients receiving oral anticoagulant therapy concomitantly with ketorolac tromethamine.

Ketorolac tromethamine does not alter digoxin protein binding.

In vitro studies indicated that at therapeutic concentrations of salicylates (300 mcg/mL), the binding of ketorolac tromethamine was reduced from approximately 99.2% to 97.5%. Therapeutic concentrations of digoxin, warfarin, acetaminophen, phenytoin, tolbutamide and piroxicam did not alter ketorolac tromethamine protein binding. Since ketorolac tromethamine is a highly potent drug and present in low concentrations in plasma, it would not be expected to displace other protein-bound drugs significantly.

There is no evidence in animal or human studies that ketorolac tromethamine induces or inhibits the hepatic enzymes capable of metabolizing itself or other drugs. Hence, it would not be expected to alter the pharmacokinetics of other drugs due to enzyme induction or inhibition mechanisms.

Ketorolac tromethamine mildly reduces the diuretic response to furosemide in normovolemic subjects. Inhibition of renal lithium clearance leading to an increase in plasma lithium concentration and potential lithium toxicity has been reported with some non-steroidal anti-inflammatory drugs. The effect of ketorolac tromethamine on lithium plasma levels has not been studied.

Concomitant administration of methotrexate and some non-steroidal anti-inflammatory drugs have been reported to reduce the clearance of methotrexate, enhancing the toxicity of methotrexate. The effect of ketorolac tromethamine on methotrexate clearance has not been studied.

There is limited experience on concurrent administration with morphine. Available information shows no evidence of adverse interactions. The extent of a possible narcotic-sparing effect of ketorolac tromethamine is currently under investigation.

### ADVERSE EFFECTS

**Toradol tablets:** The incidence of adverse reactions in approximately 600 patients and subjects receiving short-term oral therapy (less than 2 weeks) with Toradol (ketorolac tromethamine) are listed below. The most common adverse effects include: Gastrointestinal: dyspepsia (2%), gastrointestinal pain (2%), nausea (2%). Central nervous system: headache (2%), dizziness (2%).

The following adverse events are rare but have been reported (less than 1%): Gastrointestinal: flatulence, gastritis. Respiratory: dyspnea. Dermatologic: urticaria, rash, pruritus. Metabolism/nutritional: edema. Body as a whole: asthenia. Hemic and lymphatic: purpura. Musculoskeletal: myalgia.

**Toradol IM:** The adverse reactions listed below were reported to be probably related to Toradol IM in clinical trials in which patients received up to 20 doses of 30 mg of intramuscularly administered Toradol over a period of up to five days.

Incidence between 3 and 9%: Gastrointestinal: nausea, dyspepsia, gastrointestinal pain. Central nervous system: drowsiness. Incidence between 1 and 3%: Gastrointestinal: diarrhea. Central nervous system: dizziness, headache, sweating. Body as a whole: edema. Injection site pain was reported by 2% of patients in multi-dose studies (vs. 5% for morphine control group). Incidence 1% or less: Gastrointestinal: constipation, flatulence, gastrointestinal fullness, liver function abnormalities, melena, peptic ulcer, rectal bleeding, stomatitis, vomiting. Body as a whole: asthenia, myalgia. Cardiovascular: vasodilatation, pallor. Hemic and lymphatic: purpura. Nervous system: dry mouth, nervousness, paresthesia, abnormal thinking, depression, euphoria, excessive thirst, inability to concentrate, insomnia, stimulation, vertigo. Respiratory: dyspnea, asthma. Urogenital: increased urinary frequency, oliguria. Dermatologic: pruritus, urticaria. Special senses: abnormal taste, abnormal vision.

### OVERDOSAGE

The absence of experience with acute overdosage precludes characterization of sequelae and assessment of antidotal efficacy at this time. In a gastroscopic study of healthy subjects, daily doses of 360 mg given over an 8-hour interval for each of five consecutive days (3 times the highest recommended dose) caused abdominal pain and peptic ulcers which recovered after discontinuation of dosing.

### DOSAGE AND ADMINISTRATION

**Adults:** Dosage should be adjusted according to the severity of the pain and the response of the patient.

**Oral:** The usual oral dose of Toradol (ketorolac tromethamine) is 10 mg every 4 to 6 hours for pain as required. Doses exceeding 40 mg per day are not recommended.

Toradol is recommended for short-term use only i.e. for a maximum of a few weeks.

**Parenteral:** The recommended usual initial dose is 30 mg. Subsequent dosing may be 10 mg to 30 mg every 4-6 hours as needed to control pain. A lower initial dose may be suitable for patients under 50 kg in body weight, over age 65 years and/or with less severe pain at baseline. In the initial post-operative period, more frequent dosing (e.g., every 2 hours) may be employed, but the total daily dose should not exceed 120 mg. Dose above 120 mg could cause drug toxicity (see Warnings & Precautions). If supplemental analgesia is required, a concomitant low dose of opiate can be used.

The administration of continuous multiple daily doses of Toradol IM should not exceed 5 days for injection dosing. There has been limited experience with dosing for more than 5 days since the vast majority of patients have transferred to oral medication or no longer required analgesic therapy after this time.

**Directions for use:** Insert the plunger into the syringe barrel and thread it onto the screw. WITHOUT REMOVING THE NEEDLE GUARD, apply quick, firm pressure to the plunger to break the inner seal (you will feel it let go). Pull back on the plunger slightly to relieve pressure. Remove the needle guard by twisting as you pull. Use the unit as you would a normal syringe. Dispose of properly.

### CONVERSION FROM PARENTERAL TO ORAL THERAPY

Toradol tablets may be used either as monotherapy or as follow-on therapy to parenteral ketorolac. In the latter case, the total combined daily dose of ketorolac should not exceed 120 mg on the day the change of formulation is made, this includes a maximum of 4 of the 10 mg tablets.

Toradol (ketorolac tromethamine) is a Schedule F drug.

### COMPOSITION

**Toradol Tablets:** Each Toradol tablet contains ketorolac tromethamine, the active ingredient, with microcrystalline cellulose, lactose and magnesium stearate. The coating suspension contains hydroxy-propyl-methylcellulose, titanium dioxide and polyethylene glycol.

**Toradol IM:** Toradol IM is available for intramuscular administration as: 15 mg in 1 mL (1.5%), or 30 mg in 1 mL (3%) of ketorolac tromethamine in sterile solution. The 15 mg/mL solution contains 10% (w/v) alcohol, USP, and 6.68 mg sodium chloride in sterile water. The 30 mg/mL solution contains 10% (w/v) alcohol, USP and 4.35 mg sodium chloride in sterile water. The pH is adjusted with sodium hydroxide or hydrochloric acid. The sterile solutions are clear and slightly yellow in colour.

### STABILITY AND STORAGE RECOMMENDATIONS

**Toradol Tablets:** Store at room temperature. The blister package tablets should be protected from light.

**Toradol IM:** Store at room temperature with protection from light.

### AVAILABILITY OF DOSAGE FORMS

Toradol (ketorolac tromethamine) is available as 10 mg white round film coated tablets with one side printed in red with TORADOL inside a bold T and the other side with Syntex. Toradol (ketorolac tromethamine) 10 mg tablets are available in bottles of 100 and 500 tablets.

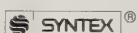
Toradol IM is available in 1 mL syringes containing 15 or 30 mg/mL of ketorolac tromethamine.

Product Monograph available on request.

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(03/05)

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**SASKATCHEWAN:** Very busy family practice, several operatories and large lab. Please reply to CDA ACCESS Box 2531. (02/06)

**ONTARIO - Brampton:** (1/2 hr from Toronto) Storefront practice for sale. Ideal for Punjabi-speaking dentist. Approximately 50,000 East Indian population with about 45,000 Punjabi-speaking. Shared reception with busy medical office. Three operatory facility with panorex, two ops equipped with Pelton & Crane equipment, new, 1986. Good gross. Asking \$135,000. Call confidentially (416) 454-2938. (08/05)

**NORTHWEST ONTARIO - Dryden:** General family practice for sale. Two operatories, laboratory, private office, shared hygienist operatory and services in eight year old professional building. Large active patient list, excellent earnings, and quality young staff. For more information, call in confidence days: (807) 223-4614, evenings: (807) 938-6400. (05/05)

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The Division of General Dentistry, Department of Restorative Dentistry is seeking a full-time tenure track faculty member effective 1 August, 1992. Applicants must hold a D.D.S. or D.M.D. Degree from an accredited Canadian or U.S. Dental School, and be eligible for licensure in Nova Scotia. Preference will be given to applicants with advanced education in general dentistry, operative dentistry, or dental anesthesiology. Applicants must have demonstrated professional development, a proven ability to administer a general practice, and to teach at the undergraduate level.

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Qualified candidates may submit their curriculum vitae with the names and addresses of three references by 1 August, 1992 to:

**Dr. T. Boran**

**Head, Division of General Dentistry  
Faculty of Dentistry, Dalhousie University  
Halifax, Nova Scotia B3H 3J5**

(05/05)



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The Division of Endodontics, Department of Restorative Dentistry is seeking a full-time endodontist effective 1 July, 1993. Applicants must be a graduate of an advanced education program in endodontics by 30 June, 1993, hold a D.D.S. or D.M.D. degree from an accredited Canadian or U.S. Dental School and be eligible for licensure in Nova Scotia. Teaching and research experience are desirable. Responsibilities will include lectures and clinical instruction in undergraduate endodontics, scholarly activity, continuing education and administrative duties. Extramural private practice privileges are available.

Dalhousie University is an Employment Equity/Affirmative Action Employer. The University encourages applications from qualified women, aboriginal peoples, visible minorities and persons with disabilities. In accordance with Canadian Immigration requirements, this advertisement is directed to Canadian citizens and permanent residents.

Qualified candidates may submit their curriculum vitae and references to:

**Dr. Stephen Brayton  
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(05/05)

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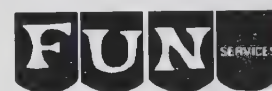
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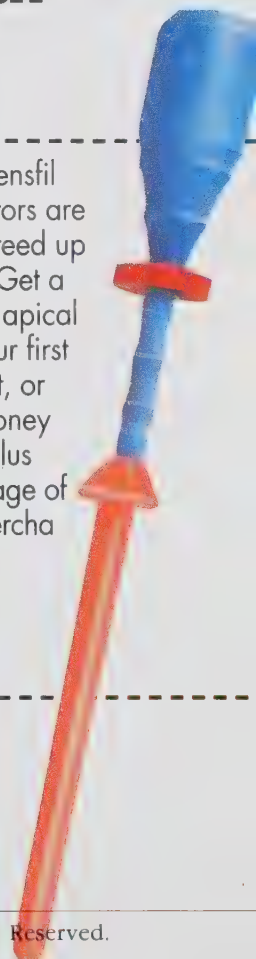
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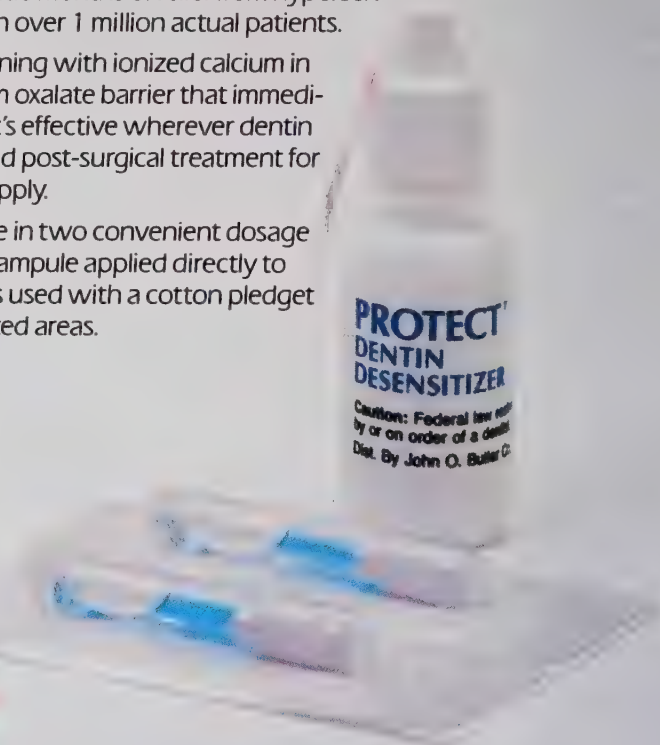
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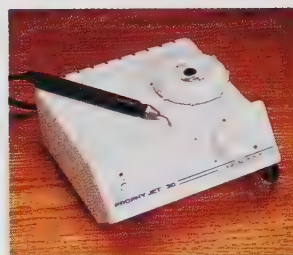
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# JOURNAL

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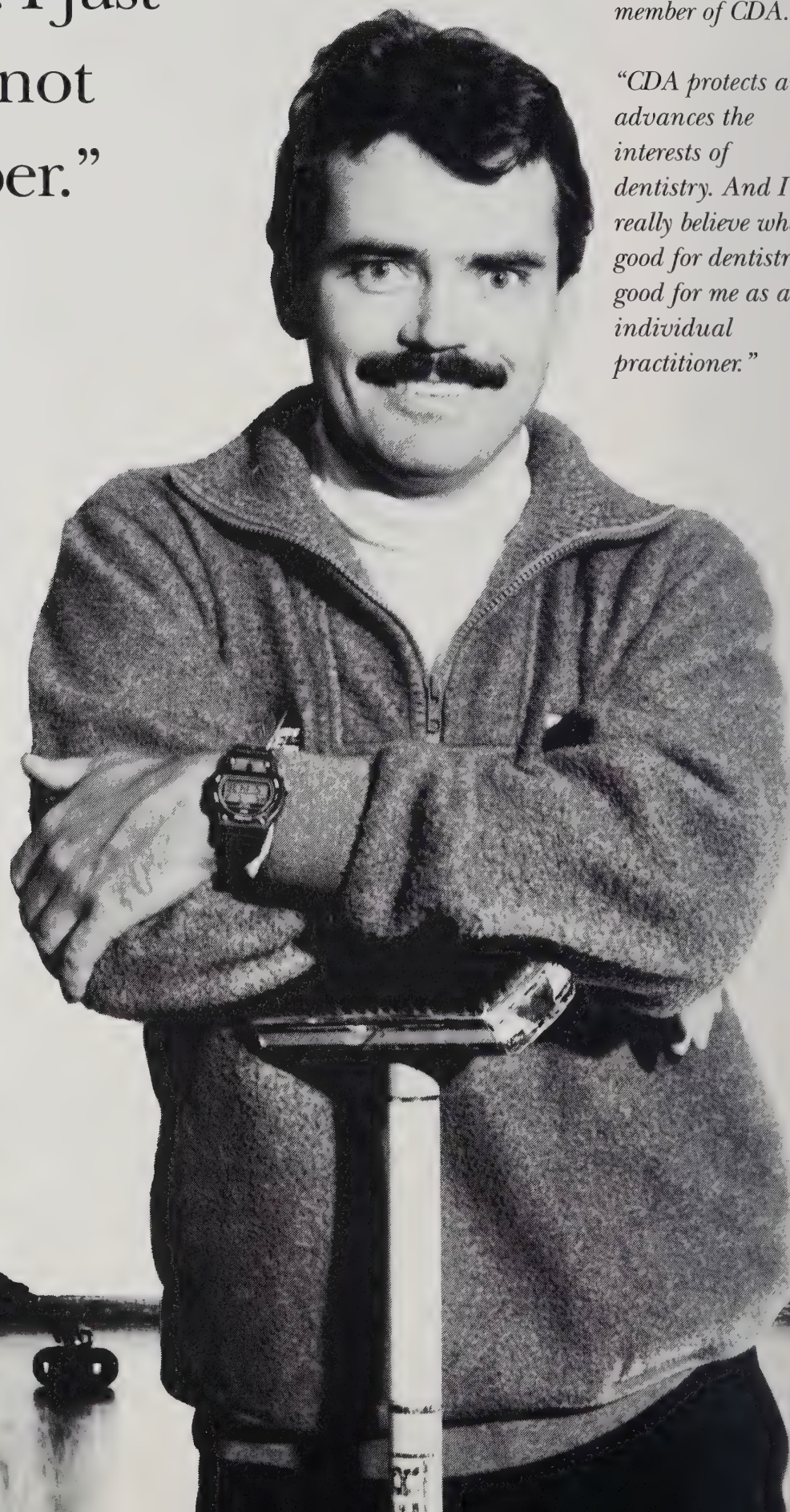
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advances the  
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individual  
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*The Canadian Dental Association is the national voice of dentistry – informing, educating, advising, advocating. It’s one of the ways CDA works for you, and for dentists all across Canada.*





# Letters



## ■ Amalgam Fees

I am responding to Dr. Kim W. Scott's letter, "Amalgam Fees," which appeared in the February 1992 issue of the *Journal*. Dr. Scott states that amalgam restorations should have fees "two or three times what they are now." I am not sure if I am more surprised by the writer's lack of understanding of economics or by his lack of sensitivity for the patient.

Fee guides are developed by dental associations after detailed financial analyses of office expenses and current time-frequency studies of a typical practitioner's working day. The resultant fees for individual procedures are justifiable and fair. For Dr. Scott to suggest that we arbitrarily double or triple them is indefensible.

If, as Dr. Scott reports, his office overhead is \$250 per hour, then perhaps this is the real problem. Doctor, heal thine overhead. No individual dentist with a staff of four needs to have an overhead of \$2,000 per day. As smart business people know, raising prices is not the only way to make a profit. Improving efficiency, lowering costs and producing a quality product can be equally if not more effective.

*G.L. Austman, DMD  
Steinbach, Manitoba*

## Editor's Note

The *Journal* welcomes letters from readers. To be published, letters must include the writer's signature and full address. They should be typewritten, double spaced and brief. The *Journal* reserves the right to edit letters for space and clarity.

(Recently, a concerned dentist wrote an excellent letter in response to our February editorial, "Youth, Our Hope for the Future." The *Journal* cannot publish this letter, as it was unsigned. However, because of its content, we encourage the writer to submit a new, signed copy of the letter for publication.)

## BOARD OF GOVERNORS NOTICE OF MEETING

The Annual Meeting of the Board of Governors of the Canadian Dental Association will be held August 28-29, 1992 (Friday and Saturday respectively) at the Convention Centre, Calgary, commencing at 9:00 a.m. on August 28.

It is brought to your attention that meetings of the Board of Governors are open to all members of the Association.

The Board is composed of twenty-seven governors with voting privileges and a Chairman. Governors represent members across Canada on a 1 to 500 ratio. The Canadian Forces Dental Services, Student members and Affiliate members from Québec are represented by one member each.

In addition, there are two non-voting members, namely, the senior dental representative of the Department of National Health and Welfare and the Department of Veterans Affairs.

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# Announcements

## NATIONAL HIGHLIGHTS

**August 28-30, 1992**  
**44th Annual Scientific Session**  
**Canadian Association of**  
**Orthodontists**  
 Calgary, Alberta  
 (416) 491-3186

**August 29-September 2, 1992**  
**1992 Canadian Dental Association**  
**Annual Convention**  
 Calgary, Alberta  
 Christine Leadman  
 1-800-267-6354  
 (613) 523-1770  
 (outside Canada)

## July/Juillet 1992

**July 1-4: 12th International Symposium on Dental Hygiene the Hague** will be held at the Netherlands Congress Centre in The Hague. For more information contact: Secretariat, Vam Namen & Westerlaken Congress Organization Services, "Dental Hygiene Symposium," PO Box 1558, 6501 BN Nijmegen, the Netherlands.

**July 9-11: 3rd Annual Convention of the Atlantic Provinces Academy of General Dentistry** being held at the Digby Pines, Nova Scotia. For information, contact: Dr. Garry Condon at (902) 678-7530.

## August/Août 1992

**August 7-9: 7th Annual Meeting of the International Society of Oral Oncology** on "Diagnosis and Management of Infection in the Immunocompromised Host" being held at the Catamaran Resort Hotel in San Diego, California. For more information, contact: Dr. R.B. Abrams, The Children's Hospital, 1056 East 19th Ave., Denver, Colorado 80218, or call: (303) 861-6788.

**August 7-10: 3rd Singapore International Dental Exhibition & Conference** in Singapore. For more details, contact: SIDEC 92, Orchard Dental Centre Pte Ltd., 268 Orchard Rd, #05-07, Singapore 0923.

**August 9-14: 70th Annual Dental Association of South Africa Congress** in Sun City, South Africa. For information, contact: Helmut Heydt, DASA Congress, Private Bag 1, Houghton 2041, South Africa.

**August 20-25: Canadian Society of Forensic Science Annual Conference** will be held in Halifax, Nova Scotia. For more information, contact: Fredricka Monti, Canadian Society of Forensic Science, Suite 215, 2660 Southvale Crescent, Ottawa, Ontario K1B 4W5 or call: (613) 731-2096.

**August 28-30: International College of Dentists, Canadian Section, Annual Meeting and Convocation** being held at the Pal-

iser Hotel, Calgary, Alberta. For information, contact: Dr. W.J. Spence, Registrar, 12A Yonge Blvd., Toronto, Ontario M5M 3G5, (416) 487-2928.

## September/Septembre 1992

**September 17-20: 28th Annual Meeting of the Canadian Academy of Endodontics** will be held in Victoria, B.C., at the Laurel Point Inn. For more information, please contact: Dr. Raymond S. Greenfeld, Convention Chairman, (604) 270-8754, or Dr. Leonard Atkinson, registration, (604) 592-2511.

**September 21-25: FDI World Dental Congress** being held in Berlin, Germany. For details, contact: Christine Leadman, CDA Conventions, 1815 Alta Vista Drive, Ottawa, Ontario K1G 3Y6.

## October/Octobre 1992

**October 14-17: 2nd Annual Meeting of the Bulgarian Dental Association** will be held

in Plovdiv and will be jointly organized with the Quintessence Publishing Group. For more information contact: Dr. J. Mihailov, Director, the Bulgarian Dental Association, 1000 Sofia, 34-A Bulgaria Ave., Bulgaria.

**October 16-17: Southern Ontario Surgical Orthodontic Study Group Meeting** in Windsor, Ontario. For details, contact: Dr. Jeff Berger, (519) 259-2632 or fax (519) 258-2637.

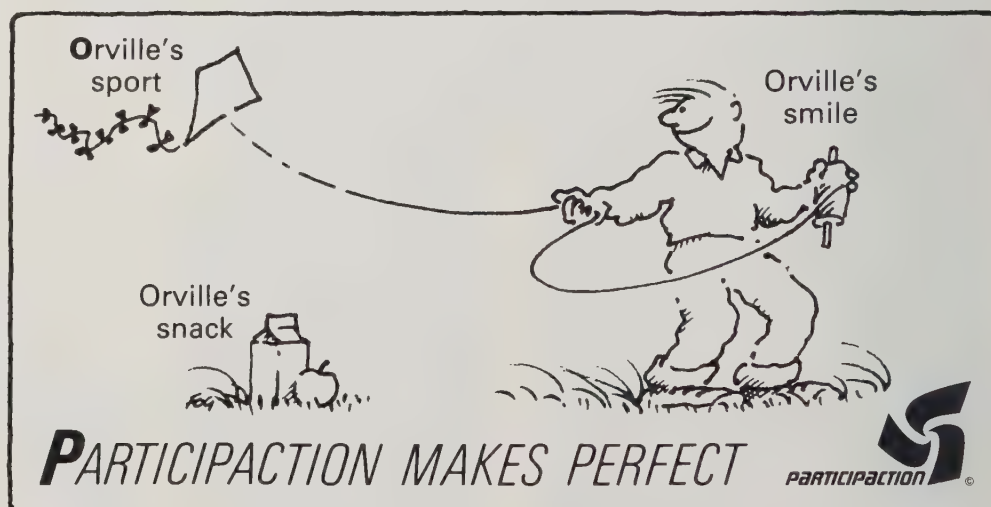
**October 17-22: American Dental Association Convention** will be held in Orlando, Florida. For information, contact: the American Dental Association, 211 East Chicago Avenue, Chicago, Illinois, 60611, or call: (312) 440-2500.

**October 28-31: 1st International Congress of the Turkish Society of Restorative Dentistry** will be held in Antalya, Turkey, at the Antalya Sheraton Voyager. For more information write: Dr. Fatma Koray, Faculty of Dentistry, University of Istanbul, 34390 Capa, Istanbul, Turkey.

**October 30-31: Craniofacial Development and Anomalies Conference** will be held at the University of Alberta. For information contact: Dr. G.H. Sperber, Department of Oral Biology, University of Alberta, Edmonton, Alberta, T6G 2N8 or fax: (403) 492-1624.

## November/Novembre 1992

**November 18-20: Swedental Annual Dental Fair** in Stockholm, Sweden. For details, write: Ms. May-Britt Carlsson, Press Officer, 125 80 Stockholm, S-125 80 Stockholm, Sweden.





## THE PHANTOM OF THE OPERATORY

Recently, I came to the conclusion that there is a phantom lurking in almost every dental operatory in the country (if not in every one of our frenetic lives).

My new-found belief stems from three events that occurred over the course of the last few weeks. First of all, my wife and I went to see *The Phantom of the Opera*. It was truly magnificent. And while today's rendition of the famous musical is probably no more powerful than the original presentation, its high-tech staging kept us enthralled throughout.

A few days later, I watched a two-part TV movie on the life of Alexander Graham Bell. Certainly, the film was devoid of the spectacular special effects I'd seen in *The Phantom*, but it kept me and millions of other prime-time viewers glued to their televisions for two nights running.

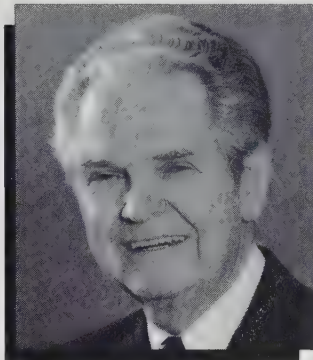
The next event was really a series of three extremely annoying incidents that occurred within a week or so of one another. Taken together, they, more than anything else, convinced me that there really is a phantom in our lives that needs extirpation.

First, I went to my bank to obtain a foreign money order – a simple, everyday procedure. Not this time. Twice the transaction was interrupted because the clerk serving me stopped what she was doing to answer the telephone. I resented it. Was I not the customer who had taken the time to come down to the bank in person, and was I not the one who had waited my turn in line? Why should an unknown being with an unknown quest take precedence over me?

Second, I had occasion to rent a car. Again, a simple event that takes place thousands of times every day. But, again, the telephone got in the way. Not once, not twice, but three times it took priority over me, the customer at the counter. On each occasion, the clerk's form-filling routine was interrupted by her instant response to a ringing electronic gadget. It seemed to be an accepted assumption that I, the sure-thing customer with cold cash in his hand, should be willing to wait patiently while the telephone phantom received immediate attention.

Third, I visited a dentist's office – not as patient but as an observer. The telephone phantom struck again! Only this time it was complicated by all the intricacies of modern infection-control techniques.

It was fascinating, really. The dentist was called



*Dr. P. Ralph Crawford*

to the telephone. (He knew who was calling, as his receptionist had partially screened the call.) Next, the dentist stripped off his gloves, threw them in the garbage, and answered the extension just outside the operatory. Finally, when the call was complete, the dentist returned to the patient, washed his hands and re-gloved. And he probably thought nothing extraordinary had happened.

But it did. Because Alexander Graham Bell's invention demanded, and was given, immediate attention, there was a break in

the dental procedure, a loss of concentration, a rude intrusion on the patient's time and money, and a need to go through a ludicrous – but necessary – re-gloving routine.

In the closing scene of *The Phantom*, Christine confronts her teacher. His true disfigurement lies not in his face, but in his soul. He suffered from an age-old problem in human relationships, where empathy, understanding and love are all too often ignored or cast aside by misunderstanding the "importance" of extraneous entities. Like the telephone.

No one is sure how or why the telephone phantom managed to gain the upper hand in our lives. Courtesy and good manners dictate that it is impolite for someone to interrupt a personal conversation between two people. But we think nothing of breaking off a discussion in mid-sentence to respond to a ringing telephone – even when we have no idea who's calling.

I, for one, am going to try to do something about it. The next time I am speaking with someone face to face – whether I am at my desk, in the dental operatory or my home – I am going to ignore the phantom on the phone. I'm going to give my full attention to the person I'm with at the time. I can always get in touch with the unknown caller, the phantom, later in the day.

So, if you call me, and there is no answer or a machine responds in my place, please don't get angry. It's only that I have realized the importance of giving my patient, my friends, my family, or whoever I'm with for that matter, the courtesy of my undivided attention.

*P. Ralph Crawford, BA, DMD*

*Editor, Journal of the Canadian Dental Association*



# WE BUILD CARS AS THOUGH WE WERE BUYING THEM, NOT SELLING THEM.



What if the people who built cars were the same people who bought them?

What if carmakers had to drive, and live with, the cars they made? For one thing, cars would be safer.

They'd have steel safety cages and collision-absorbing crumple zones, front and rear. They'd have driver's side air bags and anti-lock braking systems. Yet even then they'd be hard-pressed to equal the outstanding safety record of a Saab, which is regarded as one of the safest vehicles on U.S. roads.\*\*

Besides protecting people better, cars would protect themselves better.

Warranties would be longer, like the 6-year/120,000 km† warranty all Saabs

offer now. And cars would require less scheduled maintenance, less often, as Saabs do now. Cars would also be less boring. Engines would be spirited, suspensions surefooted, and steering systems would communicate with, rather than insulate you from, the road. Much like Saab.

But cars would also be much more flexible. A performance car would also perform at shopping malls, in car pools, or wherever else work needs to be done – like the Saab

9000S. Fold down its split rear seats, and it will effortlessly carry home large and lengthy items. Fill it with a family, and it will chauffeur them around in a sea of space and comfort.

Finally, if builders were also buyers, they'd be in no great hurry to overcharge themselves. So prices would be more Saab-like. (See the box on the left.)

In short, in this highly improbable scenario, all cars would be complete cars, compromising no one virtue for the sake of another.

We don't advise waiting for that to happen. Instead, we invite you to visit your nearest Saturn, Saab, Isuzu dealer, where cars are built by people as though they were buying them – and are sold in precisely the same spirit.

1992 Saabs now include a comprehensive roadside assistance program. See your dealer for details.

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\*MSRP for a base model 1992 Saab 900 3-door equipped with 5-speed manual transmission is \$24,965. MSRP for a base model 1992 Saab 9000 5-door equipped with 5-speed manual transmission is \$31,795. PDI included. Freight is \$625 per vehicle. GST, PST, insurance, license fees and any other taxes are not included. See dealer for details. Dealer may sell for less. \*\*Based on frequency of insurance claims filed in the United States under the Personal Injury Protection coverages. As reported by the Highway Loss Data Institute, a U.S. organization of more than 250 companies that monitors safety through actual accidents on the road in its 1990 report. †6 yrs. or 120,000 km, whichever occurs first. This limited warranty covers major components only and includes a deductible. Certain limitations apply. See your Saab dealer for complete details.



# President's Column

## PROFESSIONALISM

As members of a respected profession, it would seem only natural for dentists to have a clear idea of what it means to be a professional and of how a professional should act. But do we?

How many of us have actually taken the time to really think about what it means to be a professional, or about the responsibilities that we, as professionals, have toward the people we care for each day? Just what is the definition of professional, anyway?

You won't find a satisfactory answer in the dictionary. I know, because I checked a number of dictionaries before I sat down to write this column. I came away convinced that professionalism is a hard concept to put into words.

Some people believe that you have to dress like a professional to be a professional. And I agree with that, but only to a certain degree. I think there is a reasonable dress code that a professional should adhere to for a given occasion – formal dinners, public appearances and dental meetings, for example – as well as on a daily basis in his or her office. As dentists, we have a responsibility to represent our profession in the best possible light. But dressing well, on its own, doesn't define what it is to be a professional. There's more to it than that.

Day in and day out, dentists serve the public by providing a valuable health-care service. And we receive a fair and equitable payment in return.

Our professionalism is reflected in the way we manage and conduct our practices. Today, in these recessionary times, it takes more than solid clinical skills and a good chair side manner to operate a successful dental practice. There's also the business aspect of dentistry to consider. Revenues versus expenses, return on investment, profitability.

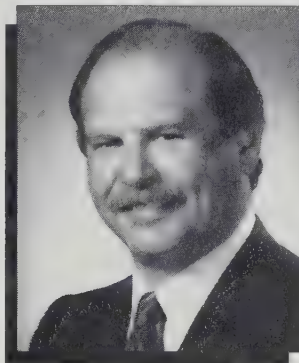
To be successful in the '90s, a dentist has to be a good businessman as well as a good dentist. It is important to remember, however, that dentists are professionals, not entrepreneurs, and should act accordingly. We are not selling hamburgers or cars.

Take advertising, for example. Dentists now have the right to advertise their services. But, as professionals, should individual dentists exercise that right?

Before answering this question, ask yourself what individual advertising would mean to dentistry. Would this type of advertising be good or right for the profession? Would it make you a better, more successful dentist? Will it keep patients coming to you?

I don't think so.

Over the past eight years, initiatives like CDA's Dental Awareness Program, as well as a number of provincial and institutional advertising campaigns, have proven remark-



*Dr. Les Allen*

ably successful. More Canadians than ever before are now attending the dentist on a regular basis, and most Canadians place a high value on their oral health. This trend has benefitted the profession as a whole, as well as individual dentists.

The point is that these awareness and advertising campaigns were all designed to increase the public's knowledge about oral health. And all of them represented dentistry in a positive way, emphasizing how the profession – as a whole – benefits the public.

I don't think individual dentists can maintain a good patient base through individual advertising. Only the kind of care that he or she provides can do that. When I hear comments like, "My ads in the phone book have increased the number of crowns I do by one a month," I question whether the crown was actually required by the patient or if it was needed, instead, to pay for the advertisement.

I think we must all take a good, hard look at ourselves, and at what it means to be a professional. Our predecessors worked long and hard to ensure the dental profession's place as a respected, equal partner in the health care fraternity. And today, thanks to them, dentists are valued members of society.

I would hate for us to tarnish that image. I would hate to see the status of the profession compromised by crass advertising. By dentists fighting among themselves to grab patients from their colleagues down the street.

As professionals, we must always consider the impact our individual actions will have on our profession – and act accordingly. That's part of what it means to be a professional.

But there's still more to it than that.

As professionals, we owe something to the communities we live in. They have not only given us their respect and trust, they have made a significant contribution, through their tax dollars, to paying the cost of our education. In return, we must provide leadership and support. It doesn't matter how we choose to get involved – through our local church or synagogue, or by participating in a community project – only that we do so. It's an integral part of being a professional. A responsibility we must not shirk.

Now, take a look at yourself in the mirror. If, after an honest evaluation, you can say to yourself, 'Hey, I'm OK,' then you know what it is to be a professional, and you know what it means to be a dentist.

*Les Allen, B. Comm., DMD  
President of the Canadian Dental Association*



# A Year of Celebration

## ODA – 125 years old

Next month, the Ontario Dental Association (ODA) will celebrate its 125th anniversary. The first dental organization of its kind in Canada, ODA was founded on July 2, 1867, in the town of Cobourg, when 31 dentists adopted its constitution and bylaws.

About nine months later, on March 3, 1868, Ontario's dentists were successful in their bid to have the powers of licensing and regulation inscribed into statute – and the Royal College of Dental Surgeons of Ontario (RCDS) was born.

## Early Dental Education in Ontario

With the passage of the 1868 Dental Act, RCDS was given full authority to control all aspects of entrance into the profession – indentureship, curriculum, and examinations – and for licensing dentists to practise in Ontario.

Today, dental educators in Ontario are indebted to the pioneers of RCDS, who toiled so diligently to make dentistry a respected profession. At the time, when



*The 1888-1889 class of the School of Dentistry (RCDS), 13 Louisa Street, Toronto. Of these students, 25 were to become the first in Canada to receive the degree of doctor of dental surgery.*

many people thought of dentistry as a trade, this was no small task.

RCDS made two unsuccessful attempts

to establish formal dental training in the province, in 1868 and 1869. It wasn't until 1875, six years later, that the RCDS board was able to persuade Dr. J.B. Willmott and Dr. Luke Teskey to undertake the formation of "The School of Dentistry." The two men were granted the sum of \$400 toward furnishings and rent.

On November 2, 1875, the school's first session opened on Church Street in Toronto with 11 students in attendance. Its year-end clinical report, as presented to the RCDS board, recorded, "259 extractions, 244 teeth on rubber base, two on pivots, 57 gold, 54 amalgam, 28 cement, seven Hill's stopping, and 16 tin fillings, 18 cases of putrescent or devitalized teeth have been successfully treated."

## University of Toronto

The next notable event in the development of Ontario's dental education system occurred in 1888, when the RCDS School of Dentistry became affiliated with the University of Toronto and a department of dentistry was established. In March 1889, for the first time in Canada, 25 graduates were conferred with the degree Doctor of Dental Surgery. Previously they had received an LDS certificate or a license to practise dentistry.

In 1925, an agreement between RCDS and U. of T. established a full faculty of dentistry at the university. Under the terms of the agreement, and for the sum of \$500,000, the school's building, furnishings and equipment became the property of the university.

### FIRST ANNUAL ANNOUNCEMENT

OF

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SESSION OF 1875-6.

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### LECTURE ROOM AND INFIRMARY: 46 CHURCH STREET, TORONTO.

First announcement of the School of Dentistry, Toronto – eventually the University of Toronto Faculty of Dentistry

*The first announcement of the School of Dentistry, Toronto, which eventually became the faculty of dentistry of the University of Toronto.*



# News Update

## Dentsply Chairman Emeritus Dead at 76

Henry M. Thornton, the chairman emeritus of Dentsply International, died April 18 in York, Pennsylvania, after a brief illness. He was 76.

Mr. Thornton was well known for his long-term commitment to dental education as well as for his efforts to foster harmonious relations between the dental industry and the profession. He joined Dentsply in 1938, becoming the company's vice-president in 1942 and its president in 1955.

In 1972, Mr. Thornton was named as the chairman of the board and chief executive officer of Dentsply, a position he retained until his retirement in 1982.

It was under his leadership, in 1959, that the company pioneered the world's first comprehensive dental care insurance program, which covered more than 3,500 Dentsply employees. That same year, Mr. Thornton also began Dentsply's sponsorship of the ADA/Dentsply Student Clinician Program.

Although it had its roots in the United States, the program is now an annual event in Canada and 11 other nations. It encourages dental students to pursue original research at the undergraduate level, while acquainting them with their national professional organization.

Mr. Thornton was one of the founders of the American Fund for Dental Health in 1955. In Canada, "seed" money provided by Dentsply helped to establish the Canadian Fund for Dental Education (CFDE), which has gone on to raise more than \$3.5 million in support of dental education, service and research over the last 30 years.

CDA recognized Mr. Thornton's outstanding contributions to dentistry in 1982, when it honored him with its Distinguished Service Award.

## Ontario Assoc. Orthodontists Elects New Board

Dr. Theodore Schipper of Downsview, Ontario, has been elected as president of the Ontario Association of Orthodontists for 1992-1993.

The other officers elected to the association's executive board include: Dr. Edmund O'Neill, Kingston, past-president; Dr. John Doucet, Niagara Falls, vice-president; Dr. Richard Marcus, Scarborough, secretary-treasurer.

## Student Affairs Committee Takes Stand on U.S. Graduates



*The Student affairs committee meets at CDA's Ottawa headquarters. Front row, left to right: Dr. Nicole Baggs, past chairman, London, Ontario; Mrs. Deborah Cooper-Lall, committee chairperson, University of Alberta; Miss Linda Teteruck, CDA director of communications; Mr. Karim Nanji, CDA student governor, University of Toronto. Middle row, left to right: Miss Coula Lombardias, University of Manitoba; Miss Mahnaz Fatahzadeh, University of British Columbia; Miss Verona Sulja, University of Western Ontario; Mrs. Win Mobley, CDA staff coordinator. Back row: Dr. Toby Gushue, CDA executive liaison, St. John's, Nfld.; Dr. Karim Ozcan, past student governor; Mr. Evan Evans, University of Saskatchewan; Mr. Marco Chiarot, Dalhousie University; Mr. Tony Chu, McGill University; Mr. Pascal Terjanian, Université de Montreal; Mr. Richard Cloutier, Université Laval; Mr. Rod Maclean, University of Alberta. Missing from photo, Mr. Harley Eklove, University of Toronto.*

CDA's committee on student affairs is concerned by a recent licensing board decision that will allow Canadian graduates of U.S. dental schools to practise in Ontario without taking their national board examinations.

The committee presented a position paper on certification and licensure to the annual meeting of the National Dental Examining Board (NDEB) last November. In the paper, the committee outlined the apprehension many students feel over the Royal College of Dental Surgeons of Ontario (RCDS)'s decision to grant licences to Canadian graduates of U.S. dental programs who have successfully written the North Eastern Regional Boards (U.S.), but not the NDEB examinations.

While the committee on student affairs recognizes the statutory authority of RCDS to make licensure decisions, they believe the college's U.S. graduate ruling was made without sufficient consultation and justification. Furthermore, as RCDS is the largest licensing body in Canada, the students fear that the decision could prompt licensing

bodies in other jurisdictions to take similar positions or, more importantly, to invoke new policies that would affect Canada's existing uniform testing procedures.

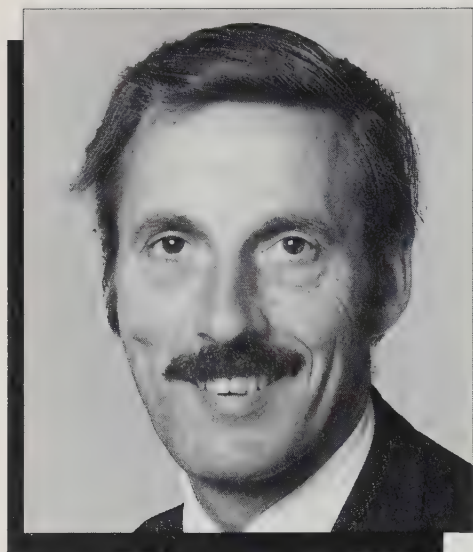
The students anticipate that the current situation in the U.S., where various jurisdictions offer separate board examinations, could also develop in Canada, with the 10 provincial licensing bodies taking individual action.

CDA's student affairs committee has been the dental students' voice and link with the profession since 1974. Committee members, representing Canada's 10 dental faculties, hold regular meetings to discuss the common problems experienced by students during their undergraduate years and their subsequent entry into practice.

Along with these and other responsibilities, the committee also elects a student representative to CDA's board of governors, arranges student/professional information sessions at each dental faculty, submits student articles to the *Journal*, and produces a student's Dental Practice Management Manual.



## Dr. Derek Jones Receives Swedish Honor



*Dr. Derek Jones*

Dr. Derek Jones, a professor of biomaterials at Dalhousie University, will receive an honorary doctorate degree from Sweden's University of Umea next October in recognition of his contribution to dental science.

A member of the faculty at Dalhousie since 1975, Dr. Jones received his PhD from the University of Birmingham in Britain. Since then, he has authored or co-authored over 200 scientific papers and abstracts, and is recognized as a world leader in biomaterials.

In 1988, Dr. Jones was selected as the recipient of the prestigious International Distinguished Scientist 'Souder' award, presented by the International Association of Dental Research (IADR). Only one other Canadian has been so honored during the award's 38-year history.

Dr. Jones's contribution to the dental profession has also been recognized by the Nova Scotia Dental Association and the Canadian Academy of Restorative Dentistry. He received CDA's Award of Merit in 1991.

Appointed to the federal government's national advisory panel on advanced industrial materials in 1990, Dr. Jones is currently the president of the Canadian Association for Dental Research. In addition, he is a long-time member of CDA's committee on dental materials and devices, the chairman of the Canadian Advisory Committee to the International Standards Organization, and a member of the international secretariat responsible for dental filling materials.

## Dr. William Youdelis Honored

Dr. William V. Youdelis of Windsor, Ontario, the inventor of Dispersalloy, has been selected as the 1993 recipient of the prestigious George M. Hollenback Prize.



*Dr. William V. Youdelis*

The annual award, presented by the Academy of Operative Dentistry, was established in honor of Dr. Hollenback, who is best remembered for his belief that the dental profession could and should be improved through research efforts. This is the second time in three years that a Canadian – and a non-dentist – has been awarded the prize. Dr. Dennis Smith, the director of the University of Toronto's Centre for Biomaterials, was awarded the Hollenback prize in 1990 for his work in dental cements.

Dr. Youdelis, currently a professor in the department of mechanical engineer-

ing, materials division, at the University of Windsor, is best known in dental circles for his development of dispersion alloys in the early 1960s. His work in this area was highlighted in a 1989 *Journal* article, "The Story of Silver Amalgam (and how a Canadian changed it all!)" (Vol. 55 No. 11, 887-890).

A 1958 University of McGill PhD graduate in metallurgical engineering and physical metallurgy, Dr. Youdelis has published 85 papers in metallurgy and holds numerous patents on amalgams and metal alloys.

Recently, Dr. Youdelis has directed his efforts toward improving dispersed-phase alloys, particularly with respect to mercury release. He has shown that the incorporation of admixed indium in dispersed-phase amalgam results in increased compressive strength, reduced dimensional change on setting, and improved resistance to creep and corrosion. More importantly, the alloy, marketed under the brand name Indisperse, has a significant biologic and environmental advantage over other amalgams, namely a marked decrease in the release of both mercury vapor and solubilized (ionic) mercury.

## Community Water Fluoridation Still Needed

A national conference on fluorides has reaffirmed community water fluoridation's role as an effective and practical way to deliver fluoride to the public – and especially to individuals who have little access to other sources of fluoride or to caries-prevention technologies.

Held in Toronto April 9-11, the Canadian Conference on the Evaluation of



*Conference delegates take part in the plenary session during the Canadian Conference on the Evaluation of Current Recommendations Concerning Fluorides.*



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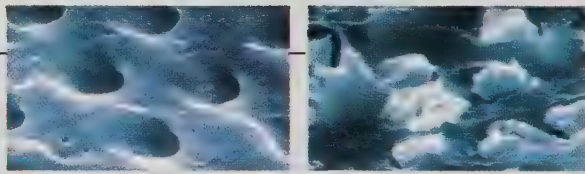
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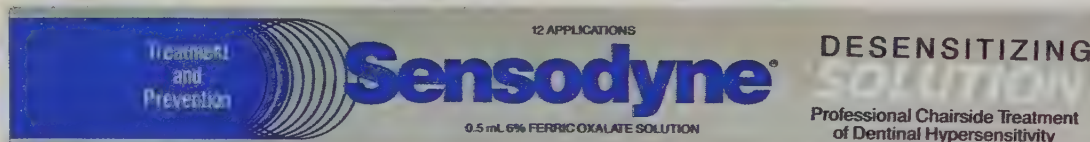
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*Workshop participants prepare recommendations to be forwarded to CDA for consideration.*

Current Recommendations Concerning Fluorides also determined that there is no evidence that fluoridation, supplied at current levels, presents a risk to public health. However, it suggested a periodic reevaluation of recommended fluoride levels to determine the optimal levels, and stated that the exposure of children to sources of fluoride other than those present in community water supplies should be restricted.

Attended by dental public health and pediatric dentistry specialists as well as dental scientists from across North America, the conference's goal was to determine how various sources of fluoride can best continue to contribute to the prevention of tooth decay in the general population.

The conference, chaired by Dr. Chris Clark of the University of British Columbia, opened with the presentation of seven papers on the various mechanisms and effects of fluoridation. This formal session was followed by a series of workshops to debate the issues and bring recommendations to a final plenary session.

The conference received generous corporate support from Procter and Gamble/Crest and Lederle Laboratories Cyanamid Canada Inc. Government support came from the Medical Research Council of Canada and the National Health Research Development Program. The workshop recommendations have all been forwarded to CDA for consideration.

#### **Papers were presented by:**

**Dr. Hardy Limeback**, University of Toronto, "A review of the biological effects of fluorides on tooth development."

**Dr. Steven Levy**, University of Iowa, "Fluoride intake and clearance from all sources for infants, children and adults."

**Dr. Chris Clark**, University of British Columbia, "Prevalence of fluorosis in optimally, low-fluoride and non-fluoridated communities."

**Dr. David Johnston**, University of Western Ontario, "Professionally applied fluorides."

**Dr. Donald Lewis**, University of Toronto, "Concerns about current effectiveness and dental fluorosis."

**Dr. Amid Ismail**, "Fluoride supplements."

**Dr. George Stookey**, Indiana University, "Self-applied topical fluorides."

### **Research Projects Funded by CFDE and Wrigley Canada**

Three undergraduate-level research projects will share \$10,000 in grants this year, thanks to the Canadian Fund for Dental Education (CFDE) and Wrigley Canada.

Made available through Wrigley Canada's Dental Student Research Award Program in cooperation with CFDE, the grants will help to fund research projects on: "Why does salivary flow rate peak initially and then decline with time to a plateau level when chewing gum is chewed"; "The salivary pH of patients as related to the degree of

# No bull.

Canadian Dentists' Insurance Program  
*The one to trust.*








*Left: Dr. Gordon W. Thompson, chairman, CFDE. Right: Ms. Tricia Rendall, manager dental program, Wrigley Canada, Inc.*

dental erosion exhibited"; and "Gum chewing as a potential strategy for reducing post-adjustment discomfort in orthodontic patients."

The grant program, which was initiated two years ago, is part of Wrigley Canada's ongoing efforts to encourage dental students across Canada to become more actively involved in research.

Applications for research funding are invited annually from Canada's 10 dental faculties. A maximum of three projects are selected to receive grants, based on the recommendations of

CFDE's advisory committee on fellowship selection and a representative from Wrigley Canada.

Preference is given to projects researching any area of oral biology, but particularly to those involving research into the benefits of salivary stimulation and caries reduction.

The projects for 1992-93 were submitted by Dr. Colin Dawes of the University of Manitoba, Dr. Carl Osadetz of the University of Alberta, and Dr. William Lobb of Dalhousie University, respectively.

## March "What's It" Solved

The March "What's It" mystery stumped everyone but Dr. Anne Dale of the University of Toronto. Dr. Dale sent us a copy of an 1871 dental catalogue that contained an illustration of our mystery item – a Taft's Extension Thimble. Before rubber dam became commonplace (Barnum first used it in 1864), and prior to the use of cotton rolls and aspirators, the only way to keep a mouth dry was with small napkins or sponges. A Taft thimble was placed on the index or middle finger to keep the napkins and sponges in place. A silver thimble sold for \$3, a vulcanite one for 40 cents.



## Obituaries

**Everett, Dr. Victor Elliott:** Born in Sea-grave, Ontario, Dr. Everett served with the 75th Battalion, CEF, during the First World War. Wounded in France, he returned to Canada and entered the faculty of dentistry in Toronto, graduating in 1921. He practised briefly in Dunnville and Hamilton before moving to Galt (Cambridge), Ontario. He passed away in London, Ontario, at the age of 95.

**Haselton, Dr. Lorne D.:** Dr. Haselton graduated from the University of Toronto's faculty of dentistry in 1928. He practised in Saskatoon, Saskatchewan, until his retirement in 1974. He was a past-president and honorary life member of the Western Canada Dental Society and an honorary member of the College of Dental Surgeons of Saskatchewan. He died April 20, 1992.

**Katz, Dr. Sydney:** Dr. Katz graduated from the University of Minnesota and the University of Alberta in 1937. He practised dentistry for 43 years in East Kildonan, a suburb of Winnipeg, Manitoba. Dr. Katz was a founding member and past-president of the Canadian Academy of Restorative Dentistry. He served as a part-time instructor with the faculty of dentistry at the University of Manitoba in the 1960s, and spent a year teaching at the University of Israel. He was a life member of the Winnipeg Dental Society as well as the Manitoba and the Canadian dental associations. He died March 12, 1992.

**Marriott, Dr. Cecil James:** Dr. Marriott graduated from the University of Alberta's dental faculty in 1951. He practised in Carnduff, Saskatchewan; Bonnyville, Alberta; and Edmonton. He died March 24, 1992.

**Metcalf, Dr. I.J.:** Dr. Metcalf graduated from the University of Toronto's dental faculty in 1922. He was a life member of CDA. He died in Whitby, Ontario, recently.

**O'Brien, Dr. J.B.:** Dr. O'Brien graduated from the Tufts University dental faculty in Boston, Massachusetts, in 1932. He was a life member of CDA. He was retired and living in New Brunswick at the time of his recent death.

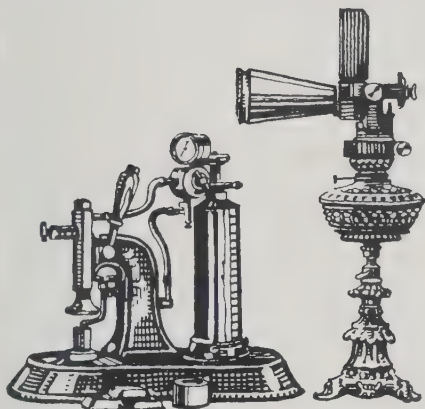
**Poirier, Dr. F.:** Dr. Poirier graduated from the University of Montreal's dental



faculty in 1949. He was a life member of CDA. He was retired and living in New Brunswick at the time of his recent death.

**Richardson, Dr. M.M.:** Dr. Richardson graduated from Dalhousie University's dental faculty in 1973. He was practising in Oakville, Ontario, and passed away recently.

**Storms, Dr. John L.:** Dr. Storms graduated from the University of Toronto's dental faculty in 1951. He died recently.



## CDA MUSEUM

**M**emorabilia from CDA's 90-year history is now on display in antique cases in the library of the Canadian Dental Association headquarters in Ottawa.

As originally planned, the displays are changed on a regular basis to suitably depict different eras of our rich dental history. Donations of museum-quality dental artifacts are still being accepted and are very much appreciated. Particularly requested are larger items such as chairs, units, cabinets and X-ray machines.

Also of interest to dental historians are the items highlighted in the column titled, **What's It?**, which appears monthly in the *CDA Journal*. This column elicits the help of readers in identifying some of the antique items presently on location in the museum.

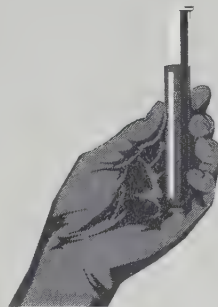
For further information, contact Dr. Ralph Crawford at the Canadian Dental Association, 1815 Alta Vista Drive, Ottawa, Ontario, K1G 3Y6. (613) 523-1770 (ext. 238) or call toll-free: 1-800-267-6354.

## Coming Soon In *Communiqué*

**O**n May 15, CDA alerted its members to be prepared for the controversy expected as the result of an upcoming television program on the potential for disease to be transmitted by dental handpieces.

Each CDA member received a letter from CDA's president, Dr. Les Allen, explaining that a soon-to-be-published scientific article entitled "Viral Studies with Contaminated Dental Equipment" would be discussed on ABC's "Prime Time Live" program.

"It appears that the article will suggest that investigation proves that viral protein can be found in handpieces following their contamination by



clinical or laboratory methods. This study cannot confirm that cross infection exists, but suggests that such potential may exist.

"You should be prepared for patient questions on risks presented by dental handpieces," wrote Dr. Allen.

Along with the letter, CDA members received a copy of CDA's Statement on Dental Handpieces, as well as a copy of CDA's Recommendations for Infection Control Procedures.

A follow-up story on the ABC broadcast will appear in the July issue of *Communiqué*, CDA's newsletter.

*Communiqué* is only available to CDA members.

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# The Dental Lab & You

## Reliable Passive Fit in Implant-Based Restorations

### The KAL-Technique

Mr. H.J. (Hyo) Maier, RDT



Mr. H.J. (Hyo) Maier

Over the past few years, implant-based prostheses have become an increasingly important part of the armamentarium of many dental practices. Advances in the general level of understanding of the response to host-site preparation and healing, as well as advances in materials and design, have combined to provide the dental profession with a proven, safe and reliable foundation for restorative procedures. This modality has helped literally thousands of fully- and partially-edentulous patients – restoring esthetics and function while reproducing the life-like beauty of natural dentition.

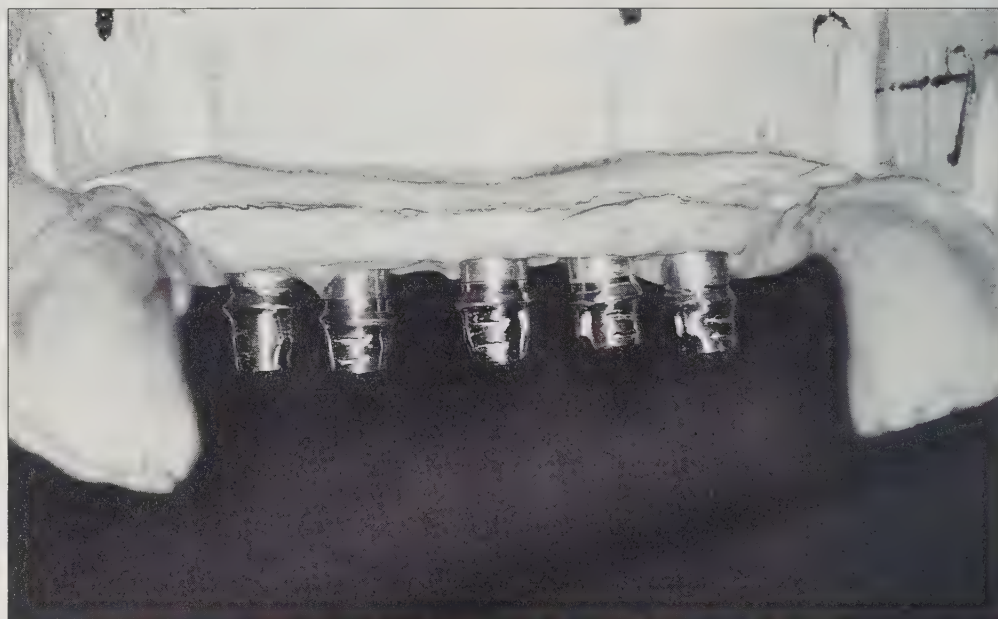
#### Passive Fit Key to Success

While there are many keys to success in an implant-based fixed detachable restoration, one of the most crucial may be the attainment of a passive fit between implant and framework. Such a fit is absolutely essential to the future integrity and longevity of the dental implant. If a totally passive fit is not achieved, the fixation screws or framework may break when the restoration is subjected to stress. Even worse, pre-

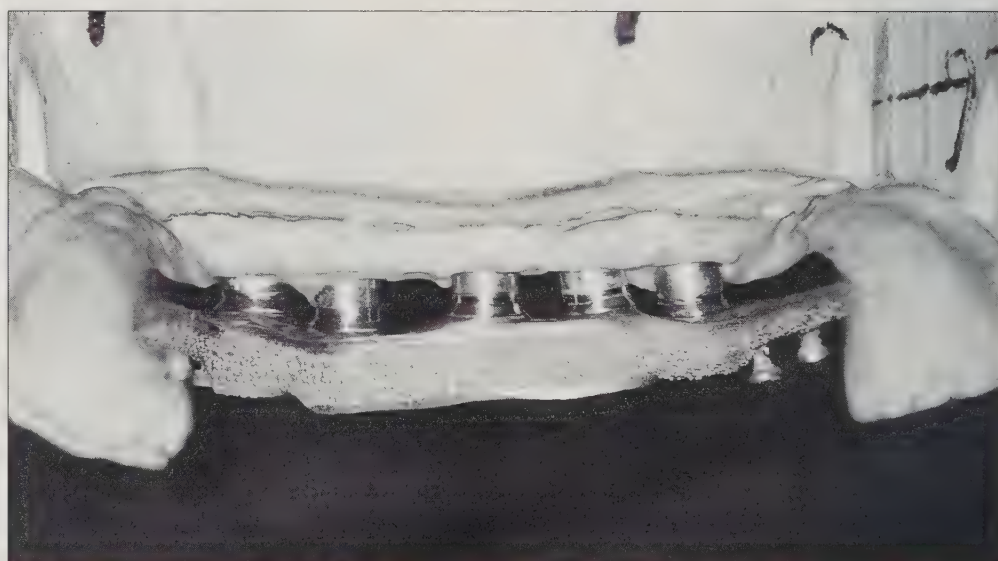
viously integrated implants could be lost.

Unfortunately, passive fits are easily compromised by master model discrepancies, soldering problems or slight errors in the use of conventional proce-

dures. In the past, an intraoral “try-in” of a fixed/detachable framework casting was required to verify that a passive fit was achieved. All too often, even though a casting fit the master model properly, the framework required in-



Ti-cylinders in position over implant abutments



Casting in position



traoral sectioning and indexing followed by soldering at the laboratory. Now, however, thanks to the KAL-Technique, the problem of non-passive fit can be easily alleviated.

### KAL-Technique Ensures Passive Fit

Based on a new concept, the KAL-Technique involves the creation of a telescopic cast framework through the chairside luting of removable "spacers" or "shims" over Attachment & Implant International Ti-Cylinders. Each Ti-Cylinder consists of a machined titanium cylinder, hexhead screw and shim spacer. Used in conjunction with a UMA tissue extension, these cylinders become compatible with most screw-retained implant systems.

Once prepared, the cylinders are screwed into the implant abutments intraorally. The case is finished after a passive fit has been achieved. The result: a prosthesis that is kinder to the implant, the retaining screws and the intraoral environment.

### Silicoater Important Factor in Success

Prior to luting, both the cast frame-

work and the cylinders are covered with an elastic ceramic surface – a thin layer of Si Ox-C. This "silicoated" surface can be placed onto any dental alloy. Luting is accomplished by covering both surfaces with an activated silane coupler and then sealing with Dentacolor Light-cure Opaque. Silicoated surfaces create gap-free resin-to-metal interfacing, without microleakage, achieve in-

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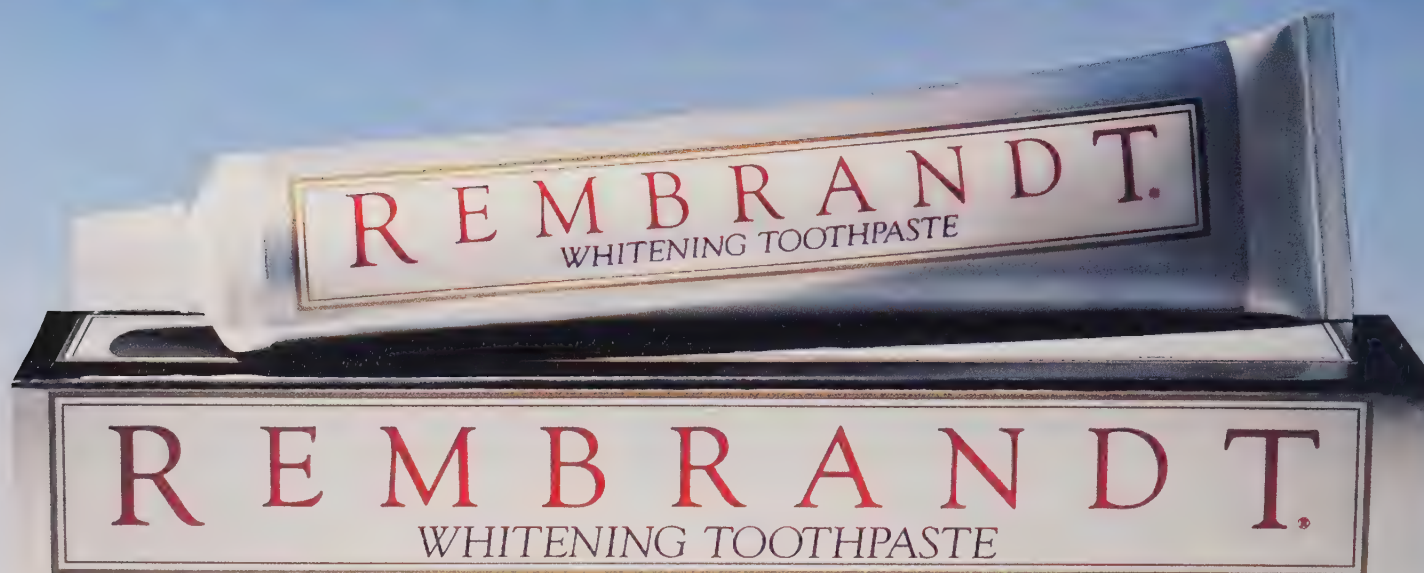
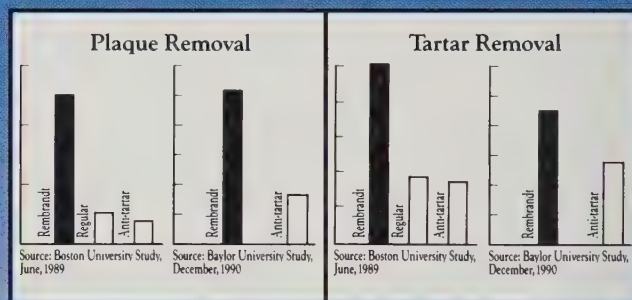
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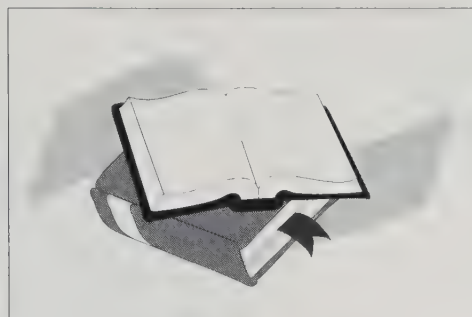
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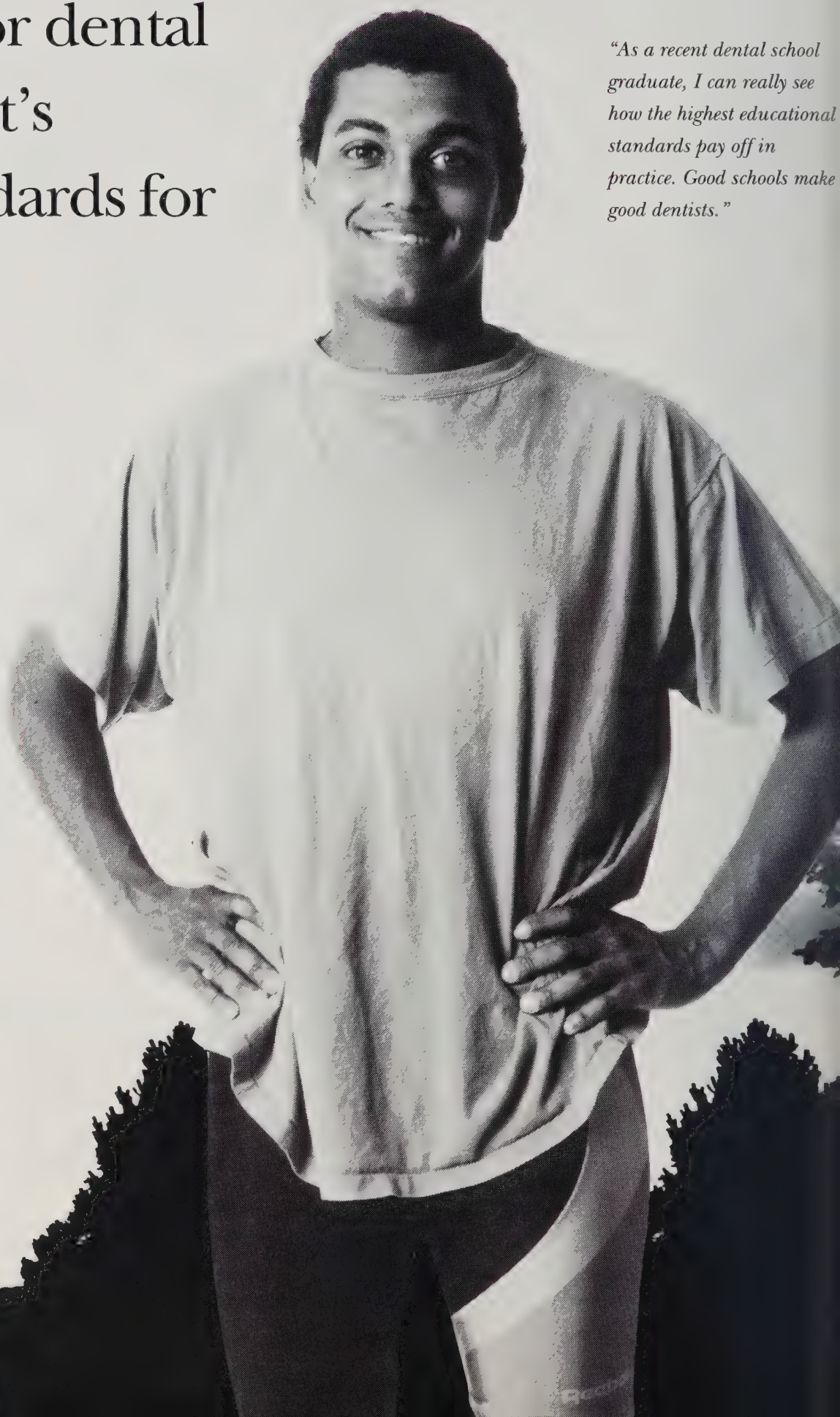
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# Practice Management & Success

## Making Every Minute Count: Effective Time Management

Most dentists have probably never heard of "Josh Billings." But nearly every dental practitioner can relate to what may be the late writer's most celebrated saying, "Time is like money; the less we have of it to spare the further we make it go."

Which brings to mind another familiar adage, "If you want something done, give it to a busy person."

Why is it that the busiest people are often the most effective time managers? Are they blessed with superhuman skills that allow them to accomplish monumental tasks in ever-more condensed periods of time? Not really. But they have honed their personal organizational skills to a remarkable, and somewhat enviable, degree.

### Three Generations of Time Management

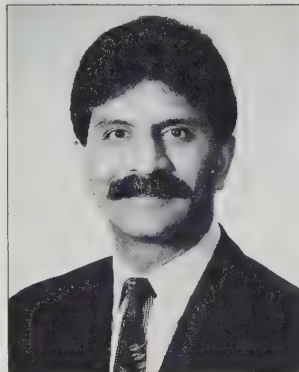
In his best-seller, *The 7 Habits of Highly Effective People*, Stephen R. Covey wrote that time management, like other human endeavors, has evolved in "waves."

The first wave, marked by innumerable yellow sticky notes and checklists, gave symbolic recognition and inclusiveness to the increasing demands on our time. What it didn't recognize, though, was the concept of priority.

That was resolved to an extent by the second wave, where personal appointment books and planning calendars represented a new, higher order of time management. More control and responsibility was evident at this level, but there was no sense of priority and no connection to deeper values and goals.

The third and current wave of time management thinking is characterized by prioritizing, assessing the relative merits of activities based on personal values, setting goals that are harmonious with those values, and daily planning.

The "gifts" of this third wave are significant, although it does have a down side. An overriding emphasis on efficiency has alienated many time management enthusiasts, who believe that rigid schedules – part and parcel of the third wave – interfere with the development of meaningful relationships



Imtiaz Manji  
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and spontaneity. Thus, some of the disillusioned have gone back to the techniques of the previous two waves.

### Entering the Fourth Generation of Time Management

Rather than regressing to previous generations, or waves, the disillusioned should embrace the emerging fourth wave of time management. This is based on the principle that time management isn't a question of managing time, it's a question of managing ourselves.

The beauty of the fourth wave of time management is that it gives those who use it the freedom to do what is really important. Where previous waves focused on things and time, this one centres on relationships and results. Here are some tools to get you on track with fourth-generation time management.

**Determine purpose, values and priorities:** You need to establish your long-term goals and to ensure that the members of your dental team share a common vision. An effective way of promoting this type of unity is to develop a purposeful, meaningful, written mission statement. But don't attempt to create one on your own. Your staff is much more likely to be committed to the goals and objectives of your mission statement if they played a part in its development.

Mission statements, which should be short and to the point, are invaluable in crystallizing practice goals. They serve as a constant reminder of not only what you are striving for, but of how you plan to get there. And when you know what you want to achieve, you're better

equipped to make sound judgements on how to allocate your time and arrange your priorities.

Once your principles are defined, you can set aside more of your time to deal with what's really important, as opposed to what only seems urgent. You will never totally eliminate urgent matters, but by dealing with the important decisions first, the crises can be minimized.

**Appointment Books:** Scrambling to fill the following day's schedule at the end of the afternoon or, even worse, the next morning creates a considerable, and unnecessary, sense of urgency. This can be avoided by taking a disciplined, planned approach to filling the appointment book. It's simply a matter of viewing the maintenance of the appointment book as one of the most important activities in your practice.

For example, if you decide that your goal is to have the appointment book completely filled two weeks in advance, identify the steps you need to take, on a regular basis, to achieve that goal. It could be that you, the dentist, will have to do complete diagnoses, with the assistants participating in case management and acceptance, and the front desk staff following up on pre-determinations. Remember, a patient's commitment to needed treatment will be encouraged by an effective, total communication effort on the part of your team. But it is the clinical team, not the administrative staff, that must convey the importance of treatment.

**Plan ahead and identify goals:** Your short-term goals – daily, weekly and monthly – need to be in line with the practice's long-term goals, as articulated in the mission statement. For instance, if one of your long-term goals is to have quality relationships with your team, you need to take the time to cultivate them. You need to schedule regular, agenda-driven staff meetings, which should allow both you and your staff to solidify a joint commitment to tapping the practice's potential. These group gatherings can be supplemented by one-on-one meetings with individual staff members, such as quarterly lunches for talking business, or by sim-



ply building rapport through a friendly discussion.

Alternatively, a long-term goal articulated in your mission statement may be to provide high-quality complete care to your patients. To achieve this, you will have to follow-up on recalls, educate and communicate with your patients, and provide clear case management.

**Delegate:** Dentists often have so many weekly goals that a casual glance at their planners – even before the week has begun – can send them into a frenzy. The solution is effective delegation.

For a number of reasons, many people aren't good delegators. For some, it's a personal choice, "I want to do it, I like doing it." For others, it's a matter of economics, "I can do it faster than I can teach it to someone else." It could even be an ego thing, "No one else can do it as well," or an empathetic one, "I don't want to put it on someone else's plate."

Whatever the rationale, the refusal to delegate is a time management no-no. You cannot do everything yourself, so you must delegate some responsibilities to the trained, skilled members of your team. This will foster growth in your practice, as well as giving you the time you need to achieve the goals that are really important to you, as a dentist.

Effective delegating comes down to effective communicating. You have to be specific about what you want, from whom and by when. Often, it helps to put these requests in writing, thus reducing the risk that something will be lost in the "translation" of verbal instructions. Be prepared to reissue your directive, answer questions (over and over), and establish performance levels and accountability. In a highly interdependent organization, such as a dental practice, you should never assume that people know what you want – they will only know if you tell them.

**Monitoring your progress:** If you have established goals and are committed to achieving them through effective time management, you are well on your way. The next step is to ensure that you stay on track.

When you first embrace time management, establish a self-monitoring system. You may want to take the last half hour of each day to review your progress and "relive" the day. Are your goals and actions in sync? Are you completing the tasks that you're responsible for? If you're having trouble with this,

consider using a time log, where you write down, in 10-15 minute increments, the nature of the work you're doing. The point here is not so much to determine how long tasks are taking, but what you're doing with your time. By understanding how you're spending your day, you'll be well on your way to understanding how you could do things better by doing them differently.

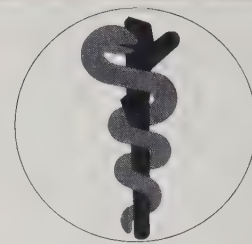
Ideally, you will get proactive with the time log. You can begin each day by writing down what you hope to accomplish and prioritizing these activities using an A, B, C, approach.

A activities are the most important, and you should be spending at least 65 per cent of your time on them. Throughout the day, you can do 15-minute time-log checks to see if what you are doing and what you want to be doing match. Be sure to allow for some flexibility, though, as emergencies will still surface from time to time. Once time management becomes second nature, you won't need to do the time log check so regularly, but to keep disciplined, you should take a week out of each month to repeat the exercise.

The time log approach works particularly well for the administrative staff. The clinical team can use a similar approach by looking over the next day's schedule a day in advance. Doing this review ahead of time will allow them to pre-plan patient and non-patient tasks around appointment times. Instead of reacting to down time as it occurs, they will already have mapped out tasks for themselves.

## Summary

Managing ourselves and putting first things first. That's the essence of fourth-wave time management. It's about prioritizing, organizing with set priorities in mind and finding the discipline to achieve these goals. If you and your team can master this, the important, not the urgent, will dictate how you use your time.



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- To live in common with him and if necessary to share my goods with him;
- to look upon his children as my own brothers, to teach them this art if they so desire without fee or written promise;
- to impart to my sons and the sons of the master who taught me and the disciples who have enrolled themselves and have agreed to the rules of the profession, but to these alone, the precepts and the instruction.
- I will prescribe regimen for the good of my patients according to my ability and my judgement and never do harm to anyone.
- To please no one will I prescribe a deadly drug, nor give advices which may cause his death.
- Nor will I give a woman a pessary to procure abortion. But I will preserve the purity of my life and my heart.
- I will not cut for stone, even for patients in whom the disease is manifest; I will leave this operation to be performed by practitioners (specialists in this art).
- In every house where I come I will enter only for the good of my patients, keeping myself far from all intentional ill-doing and all seduction, and especially from the pleasure of love with women or with men, be they free or slaves.
- All that may come to my knowledge in the exercise of my profession or outside of my profession or in daily commerce with men, which ought not to be spread abroad, I will keep secret and will never reveal.
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# The DAP Advisor

*The DAP Advisor offers information, ideas and advice to improve dentist/patient communication, raise awareness about good dental health, and help your practice become busier.*

## Patient Profiles: Worth A Thousand Words

How well do you know your patients? If you were to delve into their dental records, you would undoubtedly uncover a lot of information about their dental history. But how much do you know about their needs, concerns, desires and expectations? These are the things that make patients tick. And if you and your dental team are attuned to this information, you can go a long way toward ensuring patient satisfaction – one of the keys to your practice's success.

A useful tool for getting to know your patients is the Patient Tip Sheet. A one-page profile, the tip sheet summarizes salient information about the patient, and can provide insight into his or her personality. Here are just a few examples of what the tip sheet might include:

### Some Tip Sheet Pointers

- **Make sure the tip sheet is accessible and easy to locate.** Clip it to the inside cover of the patient's record, and write it on colored paper so it contrasts with the rest of the material in the file.
- **Keep entries short and to the point.** The tip sheet is meant to provide a brief "snapshot" of the patient, not a lengthy biography. Entries should be positive and constructive – avoid gossip.
- **Use the tip sheets as a team builder.** Make sure that everyone on your team is aware that any communication with the patient – no matter how impromptu or hasty – may yield valuable information that could help the dental team improve patient satisfaction.
- **Pull the tip sheets and review them with your team members every day.** This will ensure that everyone is familiar with the patients you will be seeing, and able to provide personalized service

### The patient prefers to be called...

Suppose your patient's given name is Wilhelmina, but she prefers to be called Billie. By including this preference on her tip sheet, and ensuring that everyone on your dental team is aware of it, you will be able to provide the sort of personal touch that may help to put this patient at ease.

### The patient values/is interested in...

Insights into your patient's lifestyle and values can provide useful information to the dental team. If you know that Billie, for example, is keen on swimming and tennis, she's obviously health and fitness minded. Therefore, she might be receptive to dental health information that stresses how important good dental health is to good health in general. Or if someone on your team has noticed that Billie is appearance conscious, and this information is recorded on the tip sheet, you will have gained a valuable insight into how to position a treatment plan for Billie.

### The patient is especially concerned about/sensitive to...

Say your patient is especially sensitive to the sounds that the drill and other operatory devices make. A notation on the tip sheet will flag this fact so that you can remember to provide headphones to the patient during treatment. Perhaps another patient voices displeasure and keeps checking his watch when he's kept waiting for an appointment. Clearly, this patient values his time, and so should you. The tip sheet is the ideal place to store this information.

### The patient was referred by...

The tip sheet is an ideal place to keep track of referrals – who referred the patient to your practice, what was the date of his or her first appointment, which dental team members have asked the patient to refer others to your practice, when were these requests for referrals made, and who did the patient refer? Remember, it is important to indicate the date of each referral request, so that the patient is not asked for referrals too frequently.

### Other Relevant Information...

This should include the patient's occupation, marital status, and the names and ages of his or her children, if any. General information of this nature can be a big help when you are trying to complete a patient's profile.

(This month's DAP Advisor was inspired by "Paint a Patient Portrait," an article in the Summer 1988 edition of the American Dental Association's Dynamic Dental Strategies.)

*The DAP Advisor is a service of CDA's Dental Awareness Program, an ongoing campaign dedicated to helping all Canadians keep their teeth Good For Life.*

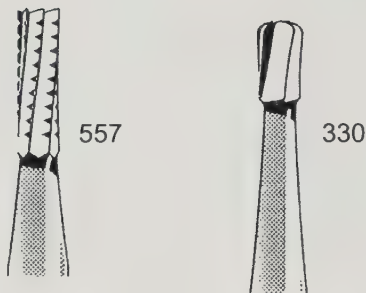


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## Psychosocial Predictors and Sequelae of Facial Change

Asuman Kiyak, Ph.D.  
Seattle, Washington

### Introduction

**P**retreatment planning and thorough patient/dentist discussions are critical to the eventual success of treatment to enhance facial esthetics. This paper focuses on patients and how they view their own appearance, as well as on how their peers and family regard them as a function of their appearance. Research on how esthetics are perceived cross-culturally and among the general population in North America will be reviewed. Studies by the author that have examined patients undergoing conventional and surgical orthodontics, and those electing implant procedures, will be addressed.

### Facial Appearance and its Significance

The appearance of the face and mouth are important areas of concern for most people. The face and mouth are the source of vocal and emotional communication, and, generally, the face is the first part of a person that others see.

In fact, the face and its individual features symbolize significant aspects of the self. Children as young as three months of age can recognize and discriminate among faces. Infants denote a preference for symmetric, smiling (i.e. more attractive) faces by gazing, smiling and cooing at them more than at faces with asymmetric or scowling features.<sup>1</sup> Conversely, a child's physical appearance is probably the most important element in eliciting a response from others. For example, attractive children, especially those with a "neotamous" face (i.e. large eyes, round face, short chin) elicit greater nurturing and assistance from adults. This Pygmalion principle is supported again and again. In school, for example, children who are described as being attractive by their teachers are often viewed as being more intelligent and better students than their less attractive peers. Yet intelligence scores do not support such perceptions. This phenomenon has even

been observed in preschool settings, where teachers typically spend more time with attractive young children, and offer them more encouragement.<sup>2</sup>

Rightly or wrongly, throughout youth and adulthood, many personality characteristics are ascribed to people with specific facial features. Attractive people are viewed by others as more intelligent, more socially adept and more successful than their less attractive peers.<sup>2-5</sup> It may even affect job success — women employees have received higher performance ratings if they are viewed as being physically attractive by their supervisors.<sup>6</sup>

It is particularly noteworthy that studies have found a considerable consensus in the ratings of attractiveness and acceptability given to various types of dental malocclusion. Faces with normal occlusion and more attractive features are evaluated more positively than those that are less attractive and have some malocclusion.<sup>7</sup> Children with oral-nasal scars and other facial abnormalities are rated as less friendly, less intelligent and less popular.<sup>8</sup> Thus, there is considerable support in the psychological literature for the expression, "What is beautiful is good."<sup>4</sup>

Such social responses, elicited from early childhood and beyond, must clearly influence the development of personality. Social reinforcement, whether positive or negative, plays a significant role in the evolution of self-concept or the definition of social identity. To the extent that children receive positive feedback regarding their appearance, intelligence and abilities, they are more likely to develop a positive self-concept. This creates a situation of self-fulfilling prophecies and greater self-esteem. Conversely, negative feedback can result in a poor self-concept.

A study comparing the self-concept of children with a cleft lip and/or palate to children without these conditions found that individuals in the former group had a significantly lower self-concept.<sup>9</sup> Young girls with clefts demon-

strate even poorer self-concept than boys.<sup>10</sup> Children with craniofacial anomalies, such as hemifacial microsomia and craniofacial dysostosis, are more introverted and neurotic, and they express a poorer self-concept than normal children.<sup>11</sup>

These findings have raised concerns among parents and clinicians regarding the need to perform surgery on children with major craniofacial deformities at a younger age. Today, reconstructive surgery often begins in infancy. Recent trends toward plastic and esthetic surgery with Down's syndrome patients also attest to a growing attempt to "normalize" the appearance of children with various facial abnormalities.

Surgery with Down's syndrome children can improve facial proportions and correct an open bite. A study by Strauss and colleagues<sup>12</sup> compared the appearance ratings that adolescents gave to these patients, using before- and after-surgery photographs, with the ratings given to children without facial deformities. Presurgically, the faces of children with Down's syndrome were rated more negatively than those of children with no deformities. These children were also rated as being less intelligent and less socially acceptable. Their postoperative photos, though rated less positively than those of the normal children, were viewed significantly more favorably in all domains than their presurgical photos.

Even in less dramatic conditions, such as extreme overjet, deep bite or crowding, an unfavorable self-concept has been found among young adults.<sup>13</sup> Should dental intervention or dento-facial surgery be encouraged at a young age for this population as well? A review of the author's research with conventional and surgical orthodontic patients may provide some answers to this question.

### Cross-Cultural Analysis

There is considerable cross-cultural variability when it comes to judgments



of facial attractiveness. To the extent that congruence exists between the dental health values of a particular ethnic group and the dental care delivery system, the ethnic group will conform to the dental profession's standards of oral health. On the other hand, ethnic values predominate in a culturally distinct group when these values clash with those found in the rest of society, and dentists can be more helpful by focusing on "culturally appropriate" methods of improving oral health.<sup>14</sup>

A sample of 50 Caucasians and 46 Pacific Asians were matched on age and socioeconomic standards in a study by Kiyak.<sup>15</sup> Both groups were asked to rate the attractiveness of nine black and white line drawings of female faces representing three types of malocclusion: crowded teeth, excess spacing, crooked teeth, and a mouth with normal occlusion. A second set of drawings illustrated the profile dimension with facial disharmony, including vertical deficiency or excess, maxillary retrusion or protrusion, and mandibular retrusion or protrusion. The results revealed that Caucasians were more likely than Asians to rate facial disharmonies as unattractive, especially on the vertical and mandibular dimensions. Malocclusion was generally rated as unattractive by both groups, although the same pattern of more negative ratings by Caucasians was found on the drawing with excess spacing. Thus, it appears that the Pacific-Asians in this sample were more tolerant and accepting of jaw disharmony and malocclusion. They consistently rated 10 of 15 drawings more favorably than did the Caucasians, and were more likely to use the more positive end of the rating scale.

When these same people were evaluated for their own malocclusions, using Grainger's Treatment Priority Index,<sup>16</sup> the Pacific-Asians were more likely than the Caucasians to have malocclusions, especially posterior crossbite and tooth displacement. This was more prevalent among the Chinese respondents than among the Vietnamese and Laotians. However, Caucasian respondents were more likely to have an overbite, maxillary overjet, and Class II malocclusions. When the type and severity of the malocclusions found among the respondents were compared with the way these individuals rated the acceptability of malocclusions in others, no significant associations emerged. Thus, it appears that cultural standards are more dominant in judging facial attractiveness than personal characteristics.

## Treatment for Dentofacial Disharmony

During the 1960s and '70s, much of the research on the psychological sequelae and outcomes of facial surgery examined people who were seeking plastic surgery primarily for esthetic reasons. For example, in 1960 Meyer and colleagues published a paper based on their psychiatric interviews with 30 women seeking rhinoplasty.<sup>17</sup> Fully half of this patient sample was diagnosed with various psychiatric conditions, with neurotic, obsessive, or schizoid symptoms being the most common. Even higher rates of psychiatric conditions were reported in a 1971 publication by Edgerton and Knorr,<sup>18</sup> who assigned psychiatric diagnoses to 72 per cent of cosmetic surgery patients. The most common problems were low self-esteem, depression, and hysterical traits, which were observed in 60 per cent of the cases. On the other hand, more recent studies by Shipley et al<sup>19</sup> and Reich<sup>20</sup> have contradicted the earlier findings. They concluded that patients seeking cosmetic surgery are psychologically stable, although they may be more concerned with physical attractiveness than are people who do not desire such surgery. This may be, at least in part, a function of the growing acceptance of cosmetic surgery in the intervening 10-15 years.

Research on the personality of patients receiving orthognathic surgery is somewhat more recent. In one of the early studies in this area, Victorin et al conducted psychiatric assessments of 95 candidates for surgical orthodontics.<sup>21</sup> They assigned psychiatric diagnoses to 92 per cent of this sample, but only 20 per cent were viewed as seriously disturbed. Later studies on similar samples of patients revealed that patients seeking this treatment have essentially normal personalities.<sup>22-27</sup> One consistent finding is that women seeking correction for dentofacial disharmony score higher than the normal range on tests for neuroticism (i.e. a tendency for sudden and erratic shifts in emotions), and that they score higher in this area than men seeking similar surgery.<sup>24-27</sup> However, they have been found to be less neurotic than patients receiving cosmetic surgery.

A primary concern with neurotic patients is that these individuals are sometimes unable to articulate why they seek surgery. Thus, there is an increased risk of dissatisfaction with the outcome of surgery. In two studies

by the author, patients with high neuroticism scores reported more pain, swelling and postoperative discomfort with eating and speech than did those with low neuroticism scores.<sup>26,28</sup>

Patients who believed that their fate was controlled by others, and not by themselves, were more likely to report negative postoperative outcomes, particularly in the area of eating and speech.<sup>25-28</sup> Introverted men also reported more problems postoperatively.

## Effects of Treatment on Self-Concept

The studies by Flanary et al<sup>24</sup> in San Antonio and Kiyak et al<sup>25-28</sup> in Seattle reveal that patients seeking orthognathic surgery and conventional orthodontics have a generally high positive self-regard rating. In that respect, they differ from studies of patients with craniofacial defects and cleft lip or palate.

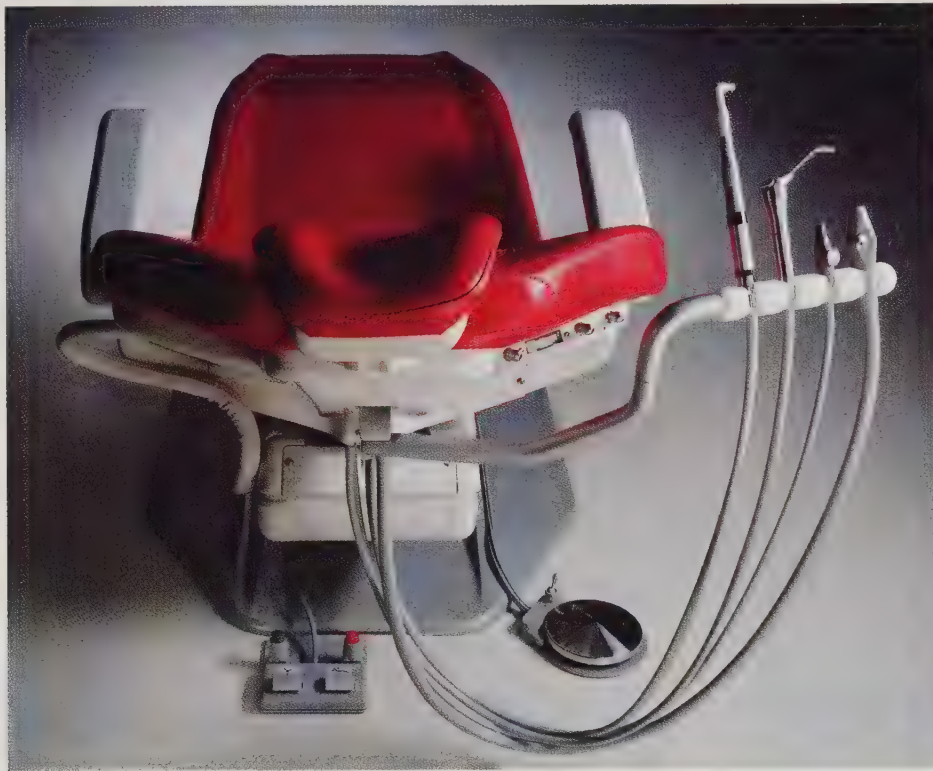
Most of the patients in these North American studies have had a diagnosis of mandibular hypoplasia. For the most part, surgery consisted of mandibular advancement, although about 25 per cent of these cases also required maxillary retrusion. Using the Tennessee Self-Concept Scale, both the San Antonio and Seattle studies found that these patients scored within the normal range. Self-esteem scores before surgery were high and remained high during the subsequent 24 months.

Both of the longitudinal studies conducted by the author<sup>26,28</sup> showed that significant improvements in body image occurred following surgery. In the second study,<sup>26</sup> this improvement was evident following orthodontic treatment alone. Prior to treatment, patients tended to use low marks in rating the attractiveness of their personal facial features, but these scores increased after surgery. Surgical patients showed greater gains in this area than conventional orthodontics patients, over time. More striking, perhaps, was the finding of a decline in body image among patients who had been advised to undergo surgery, but who decided against treatment.

Given that both orthodontics and orthognathic surgery are elective procedures, it might be useful for general dentists to understand their patients' body image and their level of satisfaction with their oral-facial features before making any recommendations for treatment. Such an approach might prevent a decline in body image among patients who are referred for treatment



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but, for whatever reason (most often financial), do not proceed with treatment.

## Psychosocial Characteristics of Implant Patients

In a separate study by the author, 39 patients who received implants participated in a series of interviews over 24 months, from presurgery to post-insertion of their implant-supported prostheses.<sup>29</sup>

Before treatment, esthetics was less of a concern than eating, with a predominance of complaints focusing on loose or poorly-fitting dentures. Orthognathic surgery patients have been found to focus more attention on their appearance. This does not mean, however, that implant patients are unconcerned with their appearance. In this sample, 41 per cent described problems with their facial profile, 40 per cent disliked the appearance of their teeth, 36 per cent rated their general appearance negatively, and 33 per cent were dissatisfied with all three aspects of their appearance.

As with the orthognathic surgery patients described above, the mean scores of implant patients improved significantly in all areas of body image from presurgery to the time of bridge insertion. It is noteworthy that patients over 65 were just as likely as younger patients to be dissatisfied with their appearance initially, and to display significant improvements following treatment.

## Conclusions

The key to such dramatically positive effects among orthognathic and implant patients may be that esthetics represents only one component of their motives for surgery. By its very nature, most cosmetic surgery is performed for purely esthetic reasons. Because esthetic improvement is an intangible quality for most patients, dentists who undertake to improve the appearance of patients must beware of those who exaggerate minor defects, or who cannot articulate the changes they are seeking.<sup>30</sup> Such patients often remain dissatisfied with the treatment, and highlight the need for dentists to determine exactly what is expected by the patient, how realistic these motives are, and how involved the treatment actually is.

One type of patient who may need special attention during the course of treatment is the individual with high neurotic tendencies. In the studies described above, patients whose emo-

tional states fluctuated easily were more likely to experience postoperative problems in the first few weeks following treatment, and they required more support and positive reinforcement.

It should be emphasized that patients scoring high on neuroticism, anxiety or other emotional states need not be excluded from treatment. Instead, the dental team must empathize with the needs and concerns of these patients. Furthermore, it is generally not necessary to evaluate all potential patients psychologically, but the dental team must be sensitized to patients who may experience problems. Nevertheless, most adults undergoing dento-facial treatment to improve esthetics and oral function experience positive outcomes, and subsequently they report significant improvements in most aspects of their lives.

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## Function: The Basis of Facial Esthetics

D.S. Precious, DDS, M.Sc., FRCD(C)

### Introduction

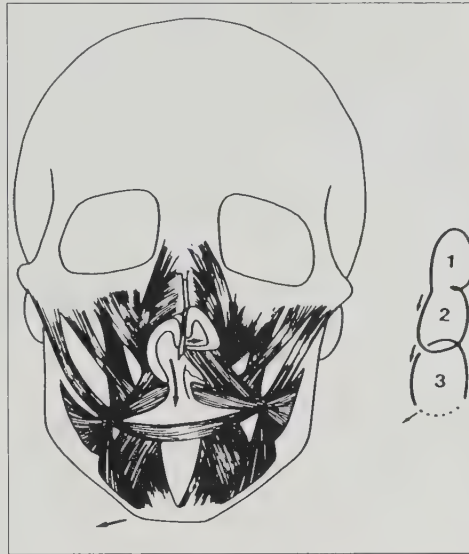
Without a full understanding and knowledge of function, it can be very difficult for clinicians treating patients with dentofacial deformities to achieve optimal esthetic results. To understand function, however, the clinician must also understand anatomy. In itself, function is dependent on anatomy, because function cannot precede the existence of the anatomic elements that support it. For this reason, the starting point for clinicians who wish to deliberately alter the dentofacial structures of a patient must be a full knowledge of the relevant anatomy.

When one knows the normal anatomy, it is possible to make a diagnosis based on a measure of the deviation from that normal state. Accurate diagnosis is the cornerstone of effective treatment. In this paper, a patient who carries the sequelae of both the cleft deformity and its correction will be used to illustrate these principles.

### Anatomy

Cleft lip and palate are the most common congenital deformities of the orofacial region. In Canada and the United States, these conditions occur at an incidence of between 1:600 and 1:1,000 live births. There are different degrees of severity, ranging from a minimal lip "notch" to a complete, bilateral labio-maxillo-palatine deformity. These deformities are produced by both genetic and epigenetic mechanisms, which are incompletely understood. The common thread to most clefts is either failure of fusion or incomplete fusion of the maxillary and medial and lateral nasal swellings, at about the seventh or eighth week in utero.

Clefts are more frequent in boys than girls (3:2), 75 per cent are unilateral and 25 per cent are bilateral. The left side is affected more frequently than the right side. Most of the anatomical elements required to construct normal form are present in the borders of the cleft, but the cleft disrupts the normal relation-



*Fig. 1: Disruption of the integrity of the three rings of the muscles of the anterior face by a cleft lip.*

ship of these structures.

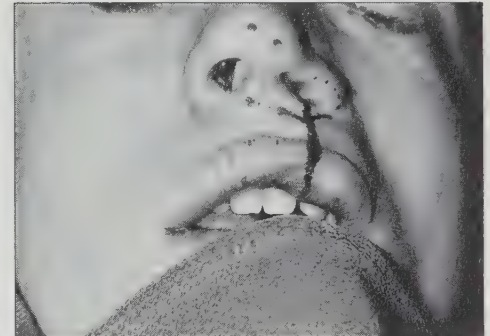
Clinically, one sees a deviation of the nasal septum to the non-cleft side, drooping of the alar base on the cleft side, bulging nasolabial muscles on the cleft side, and communication between the nose and the mouth (anteriorly from the external nose, and posteriorly to the soft palate).

The most important structures that relate to the esthetics of the face are the anterior facial muscles. Normally, these are arranged in a configuration of upper, middle and lower rings. In the case of the cleft where the junction of the first and second rings is interrupted, all of the rings, like the links of a chain, are disturbed (*Fig. 1*). This is the fundamental muscular problem found in patients who have clefts.

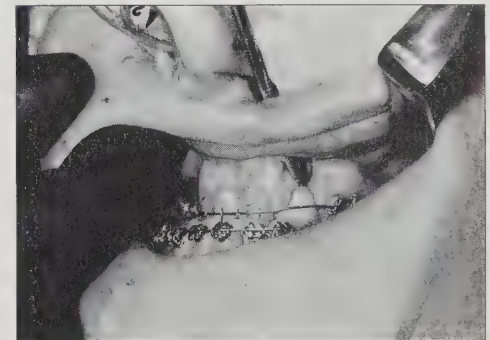
### Surgery

The ideal surgical result can be obtained by the placement of the displaced tissues into their normal position. Primary surgery, therefore, should systematically reconstruct the nostrils, floor of the nose, and lip.

There are three important muscle groups that must be reconstructed in order to obtain good function and,



*Fig. 2: Deviation of the nasal septum into the non-cleft nostril. Note also the bulge of ununited muscle at the base of the nose on the cleft side. The markings on the skin outline the proposed incisions for lip correction.*



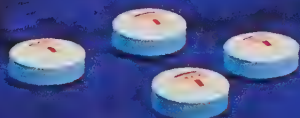
*Fig. 3: Oral nasal fistula in area of the cleft.*

hence, good esthetics of the upper lip. The lateral nasal muscle must be identified and sutured, with non-resorbable material, to the base of the cartilaginous septum near the anterior nasal spine. The levator muscles of the lip must be identified and sutured to the nasal septum anterior to the position of the newly-fixed lateral nasal muscle. Finally, the pyramidal portion of the obicularis oris muscle is identified and sutured to the most anterior portion of the nasal septum, such that the upper lip could be pictured somewhat like a circus tent, with the central pole being the anterior nasal spine and septum. Good eversion and protrusion of the lip should be possible after such muscular surgery.

If this primary surgery is carried out inadequately and/or inaccurately, how-



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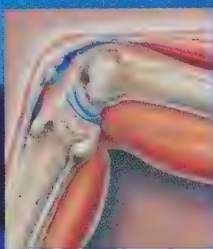
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Fig. 4: Lateral view of the corrected lip of patient in Fig. 2.

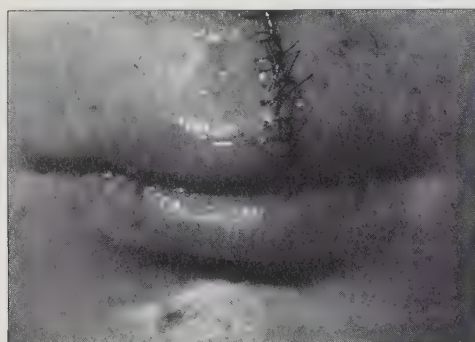


Fig. 5: Frontal view of the corrected lip of patient in Fig. 2.

ever, the three muscular rings of the anterior face remain disrupted. This imbalance will hinder subsequent growth and prevent normal, symmetrical development of the lips, jaws, and alignment of the teeth.

The muscular dysfunction that follows poor primary surgery can be diagnosed by identifying one or all of the following conditions:

1. a deviation of the nasal septum to the non-cleft side (because this structure is pulled by the attached nasolabial muscles on the non-cleft side) (Fig. 2).
2. an inability to project the upper lip in a symmetrical fashion.
3. the presence of a vestibular, oral nasal fistula (which in and of itself is proof of muscular discontinuity) (Fig. 3).

The dentist should attempt to identify muscular dysfunction. This condition can then be corrected as early as possible, thus minimizing its harmful effects on future growth.

It is now well known that the success of alveolar cleft grafting is time dependent. Ideally, this graft should be placed well before the eruption of the permanent canine tooth and perhaps as early as five or six years of age. If a patient who requires alveolar bone grafting also

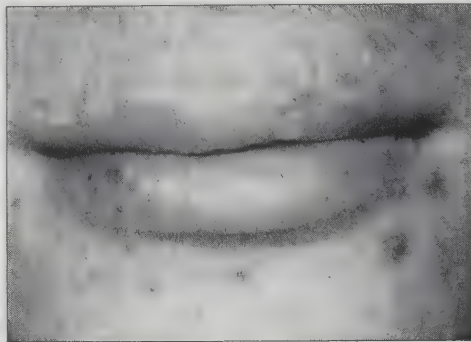


Fig. 6: Frontal view of the lip at one year post lip revision.

has muscular dysfunction, these two problems should be treated concomitantly by the oral and maxillofacial surgeon (Figs. 4,5,6).

Contrary to popular opinion, genioplasty is, in fact, a functional operation, all the more so in patients with cleft lip and palate. When maxillary growth is deficient, very frequently there is compensatory excessive vertical growth of the chin. This obviously hinders normal lip function and contributes to lip incompetence. One can think of vertical mandibular excess as the cause of imbalance in the lower muscular ring of the anterior face. The correction of this problem by functional genioplasty

helps to establish lip competence and normal or nearly normal lip function in patients with cleft lip and palate. This functional correction has a fortuitous and incidental esthetic benefit.

## Summary

Inadequate primary surgery, or a failure to establish muscular balance of the anterior face, causes muscular dysfunction. Muscular dysfunction has a nefarious effect on subsequent facial growth. Establishment of muscular balance, as early as possible, provides the best foundation for good esthetics.

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This article is based on a paper presented at the August 28, 1990, RCDC Symposium on Aesthetics in Dentistry.

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Calgary 1992 is less than three months away! It has been a great pleasure for me to work with the Organizing Committee, whose members are mostly all from Alberta. My visits to Calgary this past year have made me discover the charm of this "Western" province and the warmth of its people. In a country as vast as ours, we do not always have the opportunity to travel, experience the beauty of other areas in Canada and meet fellow Canadians ... The 1992 CDA Convention in Calgary is therefore the

RIGHT occasion for YOUR voyage of discovery this year. To quote the Organizing Committee members: "We've rounded up the best of the West for you and we can't wait to give you a 10-gallon welcome and show you a hootin' hollerin' good time!" So, hurry on down!

The convention's activities will be centered around the Palliser Hotel and the Calgary Exhibition & Stampede. Pre-convention sessions will be held at the Palliser on Saturday, August 29th and Sunday, August 30th. As of Monday morning, all activities will be transferred to the Calgary Exhibition & Stampede Round-up Centre, site of the famous Calgary Stampede. The entire scientific program and exhibits, comprised of over 200 booths, will unfold on the Stampede grounds, an experience in itself.

Calgary's avant-garde transportation system known as the LRT (Light-Rail Transit) will whisk you from the downtown area to the Calgary Exhibition & Stampede in a matter of minutes ... 4 to be exact! Trains depart every 7 minutes and, therefore, there is no need to use a car and go through the inconvenience of parking.

Calgary has a reputation for warm and friendly hospitality and, as host to millions of visitors each year, the region's hoteliers know how to take care of their guests. CDA Conventions has reserved blocks of rooms in five downtown hotels, all within walking distance from each other: The Skyline, The Palliser, The International, The Delta Bow Valley and the Westin Hotel. The Skyline Hotel is one block away from the major shopping areas and offers its guests a wide range of services, including a pool, whirlpool and sauna. The Palliser Hotel has a classic decor and is connected via skywalk to the Performing Arts Centre and downtown business core. The International is Calgary's only all-suite business hotel. The suites are ideal for families. The Delta Bow Valley has a health club with indoor swimming pool, sauna and whirlpool and a supervised Children's Creative Centre. I urge you to make your reservations today through CDA Conventions to obtain the hotel of your choice.

This year, CDA will certify attendance at individual lectures during the pre-convention and convention. Attending the CDA convention can therefore enable you to accumulate a good number of continuing education credits, while also enjoying a spectacular Social Program and the attractions of Calgary.

By pre-registering for 1992 CDA Convention, you will also qualify for the draw of two Air Canada airline tickets, courtesy of Air Canada. On site, you will also have a chance to win an "all terrain" XY 1992 Jeep sponsored by Aurum Ceramic/Classic. Other exhibit attendance prizes will be announced in next month's Journal.

I do want to thank all our sponsors this year: **Air Canada, Ash Temple/Servident, Aurum Ceramic/Classic, Caulk Canada, Coltene-Whaledent, Corevent/Dentsply, CDSPI, Degussa, Exan, Healthco/DDI and Nobelpharma.** Thanks to their generosity, we have been able to offer you many additional activities and draws.

In a few weeks, it will be summer and the heavy burden we have been carrying all winter will be lightened by the warm weather and an improved economic situation. If you are one of the lucky dentists who have been busy all year, come to Calgary and take this opportunity to share your thoughts with colleagues from across Canada. If the recession has affected your practice and you have many empty spaces in your appointment book, take advantage of the slowdown and come to Calgary. I often hear people say that attending conventions is always a boost for the entire dental team. After returning from a convention, one feels invigorated, stimulated and innovative ... ready to re-discover ideas that had been forgotten. So, pre-register today for the 1992 CDA convention in Calgary: you need it, your team needs it ... and we need to have you there!

*Dr. Michel Jahjah, D.D.S.  
General Chairman  
CDA Conventions*

## WIN A JEEP!

A jeep that is not only built to handle the "rough stuff" ... but is also built for comfort and convenience for smooth city driving.

This beautiful "all terrain" Jeep YJ 1992 can be YOURS!

All you have to do is pre-register for the 1992 CDA Convention and you will receive your draw tickets by mail with your delegate package.

This draw  
is sponsored by  
**Aurum  
Ceramic/Classic.**





## 10 GOOD REASONS WHY YOU SHOULD REGISTER FOR THE CDA CONVENTION TODAY

1. The 1992 CDA Convention is an excellent opportunity to catch up on your Continuing Education Credits. This year, CDA will **certify attendance** at individual pre-convention AND convention lectures. This will enable you to **accumulate many credits in just a few days**.
2. An excellent scientific program has been developed for the entire dental team. **The 35 lectures** on the program will cover a great variety of topics.
3. August is the best time of year to obtain **good deals on the products** you need to buy in the Exhibit Hall.
4. It's not at every Convention that you can **experience a private Rodeo**. CDA is organizing one just for you.
5. Attending a convention can give you **new ideas to "spiff up" your office**. Even small changes in decor can make your patients leave the office with a positive attitude towards their next appointment.
6. Calgary 1992 is a unique opportunity to **experience a convention with your family**. This year, the spouses/guests' program is a very elaborate one.
7. Regardless of your children's age, there is a program for each of them. This year, a program has been developed for **three different age groups**.
8. August is the perfect time to review the last four months of 1992 with your team and therefore **anticipate any changes in your practice** that may be necessary for the coming year.
9. Attending the 1992 convention means **you are supporting your Association** which will strengthen Canadian dentistry and, ultimately, **make YOU stronger**.
10. The **best antidote for a slump is to do something about it**. Attending continuing education courses is a positive action that will teach you new skills and expand your horizons.



# Calgary 1992

## Limited attendance Pre-convention Courses



Saturday, August 29

**Jennifer de St. Georges**  
Monte Sereno, California

### A.M. "Handling Key Time Management Problems"

Time management is the key to a successful practice. Subjects to be covered:

- Scheduling problems
- Nine golden rules for handling office emergencies
- 24 benefits of a five-minute morning meeting

### P.M. "Taking the Risk out of Risk Taking"

The lecturer will present participants with a prescription for tomorrow's practice.

- Giving patients quality of care
- Moving the dental practice to the next level of management



Saturday, August 29

**Howard Martin, D.M.D.**  
Silver Spring, Maryland

### "High Tech Root Canal – Flare, File, Fill"

Hands-on – Limited Attendance  
Sponsored by CAULK CANADA

This course will increase your clinical experience in technological advances to do more endodontics with ease, effectiveness and efficiency.

- Caviendo ultrasonic endodontics
- Endotec & warm lateral condensation
- Control Safe end K/H file & handle
- M series automated canal orifice opener
- 2 in 1 endo access bur for penetration and opening
- Curved canal management
- One appointment endodontics



Saturday, August 29  
Sunday, August 30

**Jay R. Friedman, D.D.S.**  
Los Angeles, California

**Gary R. O'Brien, D.D.S.**  
Los Angeles, California

### "Surgical and Prosthetic Implants"

Hands-on – Limited Attendance  
Sponsored by DENTSPLY/CORE-VENT

On the first day, the course will concentrate on the current knowledge and information relating to the surgical placement of cylindrical endosseous fixtures. Restorative implant dentistry through the use of different components will be reviewed. Evaluation and treatment planning procedures for single tooth, partially edentulous and completely edentulous patients will be discussed. Fabrication of stents will be shown. The methods of connection between natural teeth and implants, if needed, will be reviewed.

The second day of this course will feature surgical and prosthetic hands-on training.



Sunday, August 30

**Terry Donovan, D.D.S.**  
Los Angeles, California

### "Esthetic Restorative Dentistry and Materials Update"

Topics to be covered include:

- Essentials for soft tissue esthetics on fixed prosthodontics;
- Effective gingival displacement;
- New materials and techniques for fabrication of provisionals;
- Review of impression materials;
- New impression techniques;
- Solutions for fractured porcelain: metal bonding - mystery & myth;
- Current thoughts on bonding to tooth structure;
- Conservative esthetic techniques: bleaching, enamel microabrasion;
- Bonded porcelain: veneers, inlays/onlays, use in oral rehabilitation;
- Other current topics.



# CDA Convention • Calgary 1992

## CONVENTION PROGRAM

**MONDAY, AUGUST 31ST — 8:00 - 10:00**



**ROBERT BOYD, D.D.S., M.Ed.**

*San Francisco, California*

### **"Surgical, Restorative and Splinting Procedures for Stability in the Post-Orthodontic Occlusion"**

#### **GRIEVE MEMORIAL LECTURE**

The most recently developed methods of enhancing the stability of the post-orthodontic occlusion will be discussed.

**Topics will include:** frenectomy, fibrotomy, new methods for direct bonding, splinting and restorative procedures, the correct timing and integration of finishing procedures of orthodontic treatment, selective grinding and restorative procedures in the post-orthodontic occlusion.



**ROY PAGE, D.D.S., Ph.D.**

*Seattle, Washington*

### **"Prevalence, Progression and Etiology of Periodontal Disease"**

Until the 1960's, periodontitis was considered to afflict all adult humans worldwide and, once initiated, tissue destruction was thought to progress continuously until tooth loss. Currently available evidence shows that the prevalence of periodontitis

in adults is very low, and it appears to be rapidly decreasing in most, although not all, populations. Longitudinal studies on untreated patients demonstrate that progression of tissue destruction is episodic and infrequent. These observations have enormous implication for patient diagnosis and treatment, as well as for public health efforts aimed at preventing and controlling these diseases. Clearly, bacteria comprise the major etiologic factor, but the presence of bacteria alone is insufficient to cause these diseases.



**LAURALYNN MEALING**

*Burnaby, British Columbia*

### **"Opening Windows"**

To make your home computer more than an automated recipe box and letter writer, this course will introduce you to the home computer and the Windows environment. The costs, benefits, system requirements and basic operation of Windows and Windows applications will be discussed.



**DONALD YU, B.S., D.M.D., M.Sc.D.**

*Edmonton, Alberta*

### **"Micro Tissues, Macro Issues: How to Feel, Fill, Thrill Accessory Canals"**

High demand by an informed public for endodontic services demonstrates that dental practitioners must be abreast of proven and predictably successful endodontic techniques. In order to be successful in endodontic therapy, you must possess a comprehensive knowledge of the morphology and the root canal system.

hensive knowledge of the morphology and the root canal system.

**Topics will include:** radiographic interpretations of clinical cases; the rationale and therapeutic end point of endodontic therapy; how to find, feel, clean and shape the accessory canals in the root canal system; the vertical compaction of warm and plasticized gutta-percha.

**MONDAY, AUGUST 31ST — 10:30 - 12:30**



**KEN NEUMAN, D.M.D.**

*Vancouver, British Columbia*

### **"Cosmetic Imaging – The Ultimate Communication Tool"**

Computer Imaging is an evolving technique for communicating to the patient the end result before initiation of treatment.

**Topics will include:** the many uses of imaging systems, both extra and intra-oral; their communication values; the options of use with clinical examples of how to integrate these systems into daily practice; the new high tech items available today and how the use of these will impact the practice of the future.



**SHARON WOOD**

*Canmore, Alberta*

### **"Mountains of Challenge"**

*Murray MacDonald Memorial Lecture sponsored by the Canadian Fund for Dental Education (CFDE)*

Sharon Wood became the first North American woman to reach the summit of Mount Everest in 1986. Her presentation is a compelling true story about beating the odds. She speaks on meeting that challenge and the associated struggles and gains that closely parallel those of most striving individuals and organizations.

## CONTINUING EDUCATION CREDIT CERTIFICATION

### **NEW THIS YEAR!**

To help dentists, dental hygienists and dental assistants obtain continuing education credits, CDA Conventions will certify attendance at individual lectures during pre-convention and convention.

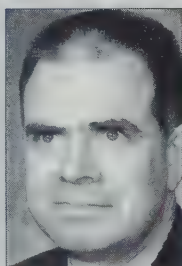


# CDA Convention • Calgary 1992

## CONVENTION PROGRAM

MONDAY, AUGUST 31ST — 10:30 - 12:30

### 75th Anniversary of Dentistry at the University of Alberta



**CHARLES BAKER, D.D.S., M.Sc.**  
*University of Alberta, Edmonton, Alberta*

#### "Contemporary Radiographic Techniques Assisting in Effective Implant Utilization"

This presentation will be devoted to a rationale for radiologic evaluation of patients prior to implant choice, methodology of examination of the maxillary and mandibular bones for site

selection and radiologic evaluation of the implant post insertion.

**Topics will include:** financial or equipment availability problems, conventional radiography, tomography, computer axial tomography.

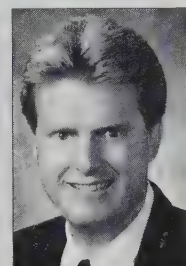


**SHARON COMPTON,**  
**Dip.D.H., B.S., M.A. (Ed.)**  
*University of Alberta, Edmonton, Alberta*

#### The Challenge and Importance of "Plaque-Free" Implant Fixtures"

This presentation will address the implications of hygiene maintenance with emphasis on the challenges it presents to the older adult.

**Topics will include:** the importance of careful monitoring implantology patients and guidelines for recall protocol, factors to consider in the examination and assessment of the peri-implant tissue.



**KEITH COMPTON,**  
**B.Sc., D.D.S., M.S.**

**CHRISTOPHER ROBINSON, D.D.S.**

*University of Alberta,  
Edmonton, Alberta*

#### "Complications with Dental Implants" – "This Could Never Happen to Me..."

This humorous, quick-moving presentation will provide both the inexperienced and experienced practitioner with thought-provoking insight when things don't go as "planned".

**Topics will include:** problem-solving with the use of a variety of implant systems and the definable criteria for success with implants.



**ROY PAGE, D.D.S., Ph.D.**  
*Seattle, Washington*

#### "Differential Diagnosis of Periodontal Diseases"

Traditionally, only one form of periodontitis, generally referred to as chronic marginal periodontitis, was recognized. Over the past decade, evidence has been gathered documenting the existence of a large family of periodontal diseases.

These have many shared common features, but they are distinctly different with regard to natural history, probable etiology, and response to therapy. Features and characteristics of the various periodontal diseases will be described and illustrated, and diagnostic criteria presented.

MONDAY, AUGUST 31ST — 14:00 - 16:00



**H. JACK STOCKTON,**  
**D.M.D., C.F.P., M.B.A.**  
*Winnipeg, Manitoba*

#### "Dental Practice Economics – Effective Financial Analysis and Planning"

The objective of this program is to present important financial information and concepts which should assist the dentist-manager in effective managerial decision-making for the dental practice.

**Topics will include:** the economics of dental practice and revenue/expense data for the typical dental practice; practice revenue mix and overhead expenses; the concept of return on investment; a useful model for dental practice analysis, budgeting and income projection; a simple method of assessing staff payroll expense.



**ALAN R. MILNES,**  
**D.D.S., Dip.Paed., Ph.D.**  
*Toronto, Ontario*

#### "Managing Children's Behaviour in the Dental Office"

One of the most important yet underrated skills which members of the dental team must develop is patient management. This is especially important when members of the dental team are interacting with children.

This presentation will address the issues which affect how a child may behave in a dental office and how this affects the response of the dentist and other team members to the child's behaviour.



# CDA Convention • Calgary 1992

## CONVENTION PROGRAM

TUESDAY, SEPTEMBER 1ST — 8:00 - 10:00

**ROY PAGE, D.D.S., Ph.D.**

*Seattle, Washington*

### **"New Approaches to the Diagnosis and Treatment of Periodontal Diseases"**

Clinical studies demonstrate clearly that progression of periodontal destruction is episodic and infrequent, and that disease-active and disease-inactive pockets exist. Thus, the traditional goal of therapy, that is, zero pocket depth, seems no longer tenable. A more appropriate goal is conversion of disease-active to disease-inactive pockets, and their maintenance in a stable state. We are hampered in this goal, however, by the fact that our traditional diagnostic procedures fail to distinguish between disease-active and disease-inactive sites. New objective chairside tests designed to aid in distinguishing between such sites have been developed and will be described. In addition, new approaches to treatment of the various kinds of periodontitis will be described and illustrated.



**NATHAN S. BIRNBAUM, D.D.S.**

*Boston, Massachusetts*

### **"Bonded Restorations for Posterior Teeth – A Comparison of Currently Available Systems"**

*Sponsored by Coltene/Whaledent*

Recent improvements in etched ceramic and bonded composite resin techniques and materials have heralded a new era in the esthetic restoration of posterior teeth.

This presentation will provide guidelines, recommended materials and describe techniques to predictably and efficiently restore posterior teeth with a broad spectrum of esthetic and durable materials. The advantages and disadvantages of each technique will be discussed. Particular attention will be given to the problems associated with these restorations and how they may be avoided. An update on dentin bonding agents and glass ionomer liners and bases will also be provided.



**JOHN MOLINARI, Ph.D.**

*Detroit, Michigan*

### **"Hepatitis B and AIDS: Challenges to Infection Control"**

The documented risk of Hepatitis B virus (HBV) and the perceived risk for Human Immunodeficiency Virus (HIV) infection have dramatically increased the awareness of dental professionals of the need for infection control.

**Topics will include:** the impact of HBV, HIV and Acquired Immunodeficiency Syndrome (AIDS) with regard to epidemiology, etiologic agents, clinic and asymptomatic diseases, transmission, high risk behavior, diagnosis and preventive measures.



**RONALD E. JORDAN, D.D.S.**

*Winnipeg, Manitoba*

### **"Anterior Composite Materials – an Update"**

Composite materials currently occupy an enormously important role in general practice dentistry primarily because they are bondable restorative systems. This course will deal specifically with up-to-date information on several important

areas of general practice dentistry, namely the anterior composite materials: how to choose a new material with confidence? The ideal composite material: what are we looking for? Have we found it? How do the present materials stand up?



**ANITA JUPP**

*Burlington, Ontario*

### **"New Horizons for the Accelerated Practice of the 90's"**

Monitoring the financial success of your practice in a constructive way and retaining qualified team members that will compliment your practice.

**Topics will include:** dealing with difficult patients, with an emphasis on service and patient communication for the acceptance of optimum dental care.



**JOHN McDOUGALL, M.D.**

*Santa Rosa, California*

### **"Nutrition for the Dental Patient"**

The dentist needs to help the patients with their diet — after all, the mouth is the portal of food entry. This presentation will focus on dietary teaching methods that the general dentist can use to educate his or her patients.

**Topics will include:** a no-cholesterol diet for heart disease patients; what to tell your dental patients with high blood pressure; simple effective weight loss for those patients who can't fit in the dental chair; the importance of nutrition in the health of the mouth; practical tips on shopping, cooking and eating.

## **A MESSAGE REGARDING THE SCIENTIFIC PROGRAM**

The Canadian Dental Association's Annual Convention is for every member of the dental team. The scientific program has been carefully developed to meet the needs of all dental professionals: dentists, dental hygienists, dental assistants, administrative personnel, dental technicians and dental students. They can all develop their professional skills and increase their working knowledge of dentistry by participating in THIS convention.



# CDA Convention • Calgary 1992

## CONVENTION PROGRAM

TUESDAY, SEPTEMBER 1ST — 10:30 - 12:30



**JOEL WHITE, D.D.S.**

*San Francisco, California*

### **"Research and Lasers: Clinical Effects"**

*Sponsored by American Dental Laser*

This presentation is designed to provide the dental practitioner with an understanding of laser physics, tissue interaction, safety and applications of the Nd:YAG laser for intraoral hard and soft tissue. The lecture will provide information on the physical effect of the laser for dentin surface modification, removal and restoration of first degree caries, reduction of root surface hypersensitivity and soft tissue excision.



**RONALD E. JORDAN, D.D.S.**

*Winnipeg, Manitoba*

### **"Dentin Bonding Agents: an Update"**

Composite materials currently occupy an important role in general practice dentistry primarily because they are bondable restorative systems. It is a well known fact that bondable materials carry with them an extremely conservative approach to restorative dentistry.

The current role of the new generation dentin bonding systems such as Allbond II, Tenure, Two Step Gluma, Kerr XR Bond and Mirage Bond in general practice will be presented in depth. The new light cured glass ionomer cements (Vitrebond; Variglass, Fuji 2 LC; XR Ionomer) and their current role in terms of anterior, posterior and geriatric applications will be defined. The role of dentin bonding agents and light cured glass ionomer cements relative to posterior composite and silver amalgam restorations will be fully discussed. The current status of silver amalgam will also be discussed in detail.



**MARY KRYWULAK, D.D.S., M.S.**

*Ottawa, Ontario*

### **"Oral Manifestations of the Pediatric Oncology Patient"**

The types of cancer seen in children are very different from those found in adults. Primarily, they include leukemias, lymphomas and brain tumors. Dental supportive care to the pediatric patient can be readily provided by establishing a preventive dental program, recognizing the oral manifestations and providing appropriate dental treatment. Some of the oral manifestations of cancer therapy will be reviewed, and treatment modalities available to the dental practitioners will be discussed.

With recent improvements in cancer therapy, many children are now considered to be "cured". Attention is now being directed at the long term complications in the increasing number of surviving children. Dental sequelae to cancer treatment are multifactorial and present unique challenges to the dental practitioners.



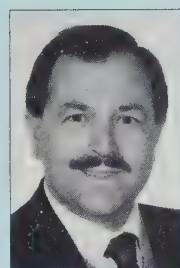
**JOHN MOLINARI, Ph.D.**

*Detroit, Michigan*

### **"Infection Control in a Changing World"**

Appropriate infection control in dental practice is a necessary, yet sometimes difficult, goal to accomplish. The documented risk of hepatitis B and the perceived risk for Acquired Immunodeficiency Syndrome (AIDS) have increased the awareness of dental professionals of the need for infection control.

**Topics will include:** the application of universal precautions for the dental treatment of all patients; the appropriate use of vaccines, barrier techniques and methods of sterilization; disinfection procedures, aseptic technique and waste management.



**EDWARD KISLING**

*Vancouver, British Columbia*

### **"How to Collect Accounts Receivable and Still Retain the Patient As a Patient"**

*Sponsored by Direct Dental Funding*

Collecting accounts receivable and granting credit are an integral part of the Canadian Business scene. However, it is only through the proper education and training of aptients and staff, through the use of sound business methods can granting and collection of accounts receivable be effective and successful.

### **Here are some additions confirmed just as the Journal was going to press!**

**MONDAY, AUGUST 31ST — 14:00 - 16:00**

**CLYDE A. HARRIS, F.L.M.I. & CYRIL J. GALLANT, C.L.U.**

*Willowdale, Ontario*

Canadian Dentist's Insurance Program (CDIP) and the Canadian Dental Association Retirement Savings Plan (CDA RSP) – Your Best Insurance and Retirement Investment Choice



Calgary, Alberta

(Photo courtesy of Calgary Visitor's and Convention Bureau)



# CDA Convention • Calgary 1992

## CONVENTION PROGRAM

TUESDAY, SEPTEMBER 1ST — 14:00 - 16:00



**HAROLD GOODIS, D.D.S.**

*San Francisco, California*

### **"Lasers in Endodontics"**

*Sponsored by American Dental Laser*

This presentation is designed to provide the dental practitioner with an understanding of laser physics, interaction and application of the Nd:YAG laser system in endodontics: to compliment hand cleaning and shaping, removal of smear layer and organic tissue remnants, and sterilization of the root canal space. Possible alteration of the normal morphology of intracanal dentin and ability to close dentinal tubules will be discussed together with the ramifications of laser usage in increasing the success of endodontics.



**STEVEN LEWIS, D.D.S.**

*Los Angeles, California*

### **"Esthetics and Osseointegration"**

*Sponsored by Nobelpharma*

Over the past several years, there has been an evolution in implant components improving the esthetic results. These components now make osseointegration as acceptable for partially edentulous patients as for edentulous patients.

**Topics will include:** a review of the history of osseointegration and its application in the treatment of partially edentulous patients providing esthetic restorations.



**ANNETTE LINDER, R.H.D., B.S.**

*Richmond, Virginia*

### **"Recall Redefined: Design for Clinical and Practice Success"**

The recall appointment has been considered the most undervalued appointment. This course will provide the requirements for design and implementation of a recall appointment.

**Topics will include:** developing a pro-active model for patient participation, creating the New Patient recall, functions of the recall appointment, identification of periodontal, restorative and esthetic dental needs, communication skills that facilitate case acceptance.

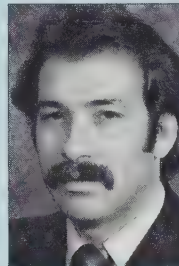


**JOHN MCDUGALL, M.D.**

*Santa Rosa, California*

### **"Nutrition in the Cause and Treatment of Disease"**

This presentation will cover the treatment of diseases commonly seen in our society, with an emphasis on nutrition and lifestyle. The presentation will focus on dietary teaching methods that you can use to prevent and usually cure chronic disease. Common diseases include obesity, high blood pressure, heart disease (high cholesterol), diabetes, cancer, gastritis-esophagitis, constipation, colitis, multiple sclerosis and arthritis.



**VANIK JINOIAN, M.D.T.**

*Bad Sackingen, Germany*

### **"The In-Ceram, All Porcelain Crown and Bridge System"**

*Sponsored by Degussa Canada Ltd.*

The presentation will focus on IN-CERAM, a dimensionally stable alumina core with a flexural strength of 550 MPA and the substructure marginal strength of 550 MPA and the substructure marginal fit on twenty (20) microns. These features make it the strongest and most accurate porcelain system today without the use of a metal substructure. Coupled with the new generation ALPHA opalescent porcelains, this restoration is ideal for producing superior esthetic all-porcelain crowns and bridges.

## Table Clinics

Table Clinics are defined as a brief table top presentation or demonstration of five to ten minutes duration using visual aids, and repeated over a 2 1/2 hour period.

**Those interested in presenting, write to:**

**TABLE CLINICS**  
CDA Conventions  
1815 Alta Vista Drive  
Ottawa, Ontario K1G 3Y6

## FDI 1992 World Congress

### Berlin, Germany

The 1992 FDI World Dental Congress will be held in Berlin, Germany from September 21-25, 1992 and the Canadian Dental Association has appointed TourCan Inc. as the official travel agency for the 1992 FDI World Dental Congress.

A tour package has been prepared for Canadian dentists wishing to combine business with pleasure.

A post-convention tour (September 26 - October 4) will combine seminars and meetings with a cruise down the Nile River, and visits to Cairo, Luxor, Aswan and Abu Simbel.

Brochures and details on how you can register may be obtained through CDA Conventions. Call 1-800-267-6354.



# CDA Convention • Calgary 1992

## CONVENTION PROGRAM

WEDNESDAY, SEPTEMBER 2ND — 8:00 - 10:00



**ANNETTE LINDER, R.H.D., B.S.**

*Richmond, Virginia*

### "Hygiene Department Development"

This course will show you how to transform the hygiene department (and the entire practice) into one that is clinically responsible, ethically sound and highly productive!

**Topics will include:** research update and clinical overview, the 4-function recall appointment; treatment modalities, case planning, case acceptance; active therapy vs. maintenance, scheduling effectively, staff development, interpersonal skill development.

Here are some additions confirmed just as the Journal was going to press!

WEDNESDAY, SEPTEMBER 2ND — 8:00 - 10:00

**TERRY MORGAN, D.D.S.**

*Red Deer, Alberta*

Coronal Radicular Build-ups – Current Dilemmas

**BRIAN WHITESTONE, D.D.S., M.R.C.D. (C)**

*Calgary, Alberta*

Oral Pathology and the Surgical Management of Same

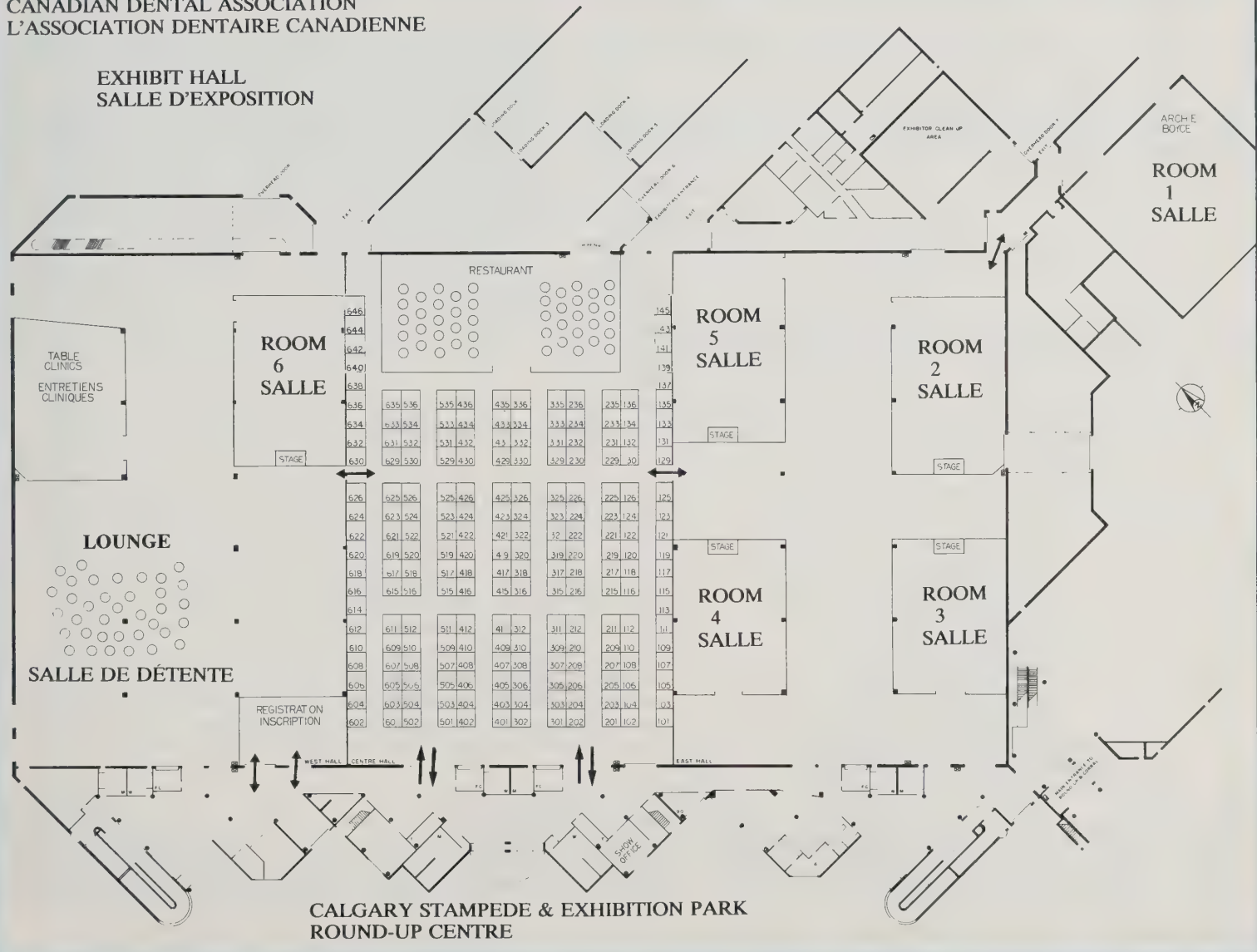
**DR. NEIL A. FARRELL**

*London, Ontario*

Fluoride

CANADIAN DENTAL ASSOCIATION  
L'ASSOCIATION DENTAIRE CANADIENNE

EXHIBIT HALL  
SALLE D'EXPOSITION



CALGARY STAMPEDE & EXHIBITION PARK  
ROUND-UP CENTRE



# Calgary 1992

## Spouses' Program

The sheer variety of this program will convince you to register today!

### MONDAY, AUGUST 31, 1992

- |               |                                                                                                                                                                                                                                                                             |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:00         | Breakfast                                                                                                                                                                                                                                                                   |
| 10:30 - 12:30 | Sharon Wood, the first North American woman to reach the summit of Mount Everest in 1986, will present a compelling true story about beating the odds in "Mountains of Challenge".                                                                                          |
| 12:30 - 16:00 | Rotary House - Stampede Grounds: Hors d'oeuvres and wine will be served against a background of music played by Harpist Debra Nyack. Later, we will bring the shopping to you! Local artists and artisans will display their dazzling creations for your shopping pleasure. |

### TUESDAY, SEPTEMBER 1, 1992

- |               |                                                                                                                                                                                                                                                                                      |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07:00 - 08:00 | Breakfast                                                                                                                                                                                                                                                                            |
| 08:00 - 10:00 | Helen Vanderburg, world swimming champion and a fitness professional, member of the Canadian and International Sports Hall of Fame, will present "Building a Lifestyle for Success". The topics will include: characteristics of high performers, attitude, energy and goal-setting. |
| 10:00 - 12:00 | Transfer by bus to Spruce Meadows and tour this world-class equestrian centre                                                                                                                                                                                                        |
| 12:30 - 12:50 | Presentation by Brenda Finley, co-producer and host of Calgary Television's daily news program, the second most watched late night local news program in the country.                                                                                                                |
| 12:50 - 14:00 | Lunch accompanied by the flute and guitar duo "Flute Plus"                                                                                                                                                                                                                           |
| 14:00 - 14:30 | Entertainment by Eddie and the Earthtones                                                                                                                                                                                                                                            |
| 15:00 - 15:30 | Depart Spruce Meadows for Calgary                                                                                                                                                                                                                                                    |

## Programs for Tots, Children and Teens

### Different Activities for each Age Group!

#### TOTS' PROGRAM (ages 2-4)

##### Monday, August 31st and Tuesday, September 1st

A drop-off centre at the downtown YM-YWCA has been reserved for your convenience. While you are enjoying the spouses program and doing some shopping in Calgary, your tots will be playing games and having great fun, under the professional supervision of YWCA day-care providers.

#### CHILDREN'S PROGRAM (ages 5-12)

##### Monday, August 31st

- |               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| 07:45 - 08:15 | Pick up at Convention Hotels (parents must sign in their children)                      |
| 08:30         | The Morning Show                                                                        |
| 09:00         | Swimming at the YWCA                                                                    |
| 10:30         | Visit to the Calgary Energium                                                           |
| Noon          | Lunch at the top of the Calgary Tower                                                   |
| 13:30         | Rollerskating (Lloyd's Rollercade)                                                      |
| 16:00 - 17:30 | Return to YWCA and drop off at Convention Hotels (parents must sign out their children) |

##### Tuesday, September 1st

- |               |                                                                                                             |
|---------------|-------------------------------------------------------------------------------------------------------------|
| 07:45 - 08:15 | Pick up at Convention Hotels (parents must sign in their children)                                          |
| 08:30         | The Morning Show                                                                                            |
| 09:00         | Bus pick up for Calaway Park                                                                                |
| 09:30         | Visit the Flintstones in Calgary's Bedrock theme park. Rides, live shows, and many more attractions. Snack. |
|               | BBQ LUNCH                                                                                                   |
| 16:00 - 17:30 | Return to YWCA and drop off at Convention Hotels (parents must sign out their children)                     |

#### TEENS' PROGRAM (ages 13-16)

##### Monday, August 31st and Tuesday, September 1st

The Alpine Club of Canada offers overnight mountain adventure for your fun-seeking, active teens! Teens will be bussed from Calgary to Lake O'Hara and Roger's Pass where they will experience the beauty of the great Alberta outdoors, accompanied by professional guides. Registration fees include food, accommodations, transportation, guides and chaperones.





# CDA Convention • Calgary 1992

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SUNDAY, AUGUST 30 • 5:00 - 7:00 p.m.

This colourful and animated event will be held at Calgary's elegant Centre for Performing Arts.

The star-studded variety show will feature the Young Canadians, an energetic group of singers and dancers who have earned top billing at the Stampede's Grandstand Show – and an international reputation as first-class entertainers.

Sharing the spotlight with the Young Canadians is country vocalist Cindy Church and her band, the Rhythm Rangers. A native of Alberta, this performer is becoming known nationwide for her unique vocal stylings.

And there's more! Space is limited, so register today!



MONDAY, AUGUST 31

6:00 p.m. - 1:30 a.m.

### STAMPEDE RODEO NIGHT

*organized exclusively for CDA delegates!*



This evening is designed to give you a front-row seat for the rough and rowdy events that made the Stampede famous. You'll experience the thrill of watching the world's finest cowboys battle against the meanest, toughest outlaw stock. You'll see it all – from calf roping to bull riding to steer wrestling – and you'll discover why the Stampede has been branded "The Greatest Outdoor Show on Earth."

When the wild-west rodeo is over, a honkey-tonk dance will be in full swing and you'll be able to join the lively two-step dance company ... for a little fancy footwork.

TUESDAY, SEPTEMBER 1

7:00 p.m. - 1:00 a.m.

### WESTERN FORMAL GALA

The cherished President's Gala Dinner and Dance ... is going Western!

The dress is "black-tie cowboy" which means you can combine your tux jacket with a bolo tie, silk shirt, blue jeans ... and of course, your cowboy hats and boots. The same goes for ladies.

The evening will offer you plenty of opportunity to swing your partner to the Big Band sounds of the Eric Friedenberg Orchestra, and the music of the 50's, 60's and 70's, performed by the Fun Company.





# 1992 CANADIAN DENTAL ASSOCIATION ANNUAL CONVENTION

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\* Prices do not include GST or PST (5% PST in Alberta)

Arrival Date: \_\_\_\_\_ Arrival Time: \_\_\_\_\_ Departure Date: \_\_\_\_\_

All changes and/or cancellations must be made through CDA Conventions (613) 523-1770.

In order to reserve a room, a guarantee for the first night is essential. The guarantee will apply to the first night ONLY.  
To cancel your reservation advise the CDA at least three (3) days prior to your arrival.

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Not to be overlooked, Air Canada has graciously offered two economy class return tickets good for travel on any Air Canada serviced destination (except Bombay and Singapore). This will be the prize awarded in our Advance Registration Draw. To be eligible for the draw, dentists and dental team members must register for the convention before July 10, 1992.







# CDA Convention • Calgary 1992

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3-M Canada

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## Assessment of the Effectiveness of Dental Sterilizers Using Biological Monitors

B. McErlane, B.Sc., RT

W.J. Rosebush, DMD

J.D. Waterfield, M.Sc., Fil. dr.

### ABSTRACT

*This study was undertaken to evaluate the effectiveness of steam, chemical vapor, and dry heat sterilizers, over a three-year period, in dental operatories subscribing to the University of British Columbia's sterilization monitoring service. A total of 4,579 sterilizer loads were tested. The results demonstrated an overall failure rate of 4.4 per cent. Individual failure rates for each type of sterilizer were: chemiclaves, 4.9 per cent; steam autoclaves, 2.3 per cent; and dry heat ovens, 7.9 per cent. In 38 per cent of these cases, the reasons for failure could be attributed to a definite cause.*

### SOMMAIRE

*On a effectué une étude de trois ans afin d'évaluer l'efficacité des stériliseurs à vapeur ordinaire, à vapeur chimique et à air chaud utilisés dans les cabinets abonnés au service de vérification du Département de biologie buccale. Sur les 4 579 stériliseurs vérifiés, le taux d'échec s'est élevé à 4,4% (4,9% pour ceux à vapeur chimique, 2,3% pour ceux à vapeur ordinaire et 7,9% pour ceux à air chaud). Dans 38% des cas, on a pu déterminer précisément pourquoi l'appareil fonctionnait mal.*

### Introduction

Infection control is essential to good dental practise. An increased awareness of the potential for infectious disease transmission to occur in the dental operator has led the Centers for Disease Control and both the Canadian and American dental associations to formulate stricter infection-control guidelines.<sup>1,2</sup>

Recommendations on the proper use of sterilization procedures form a central component of these guidelines. Six sterilants have been approved and are now in general use: steam, chemical



Mrs. B. McErlane of the department of oral biology, University of British Columbia, readies spore cultures for the Sterilization Monitoring Service.

vapor, dry heat, chlorine dioxide, ethylene oxide, and glutaraldehyde-containing liquid. Equipment malfunction may cause these sterilants to be ineffective, however. If this occurs, and the problem goes undetected, patients can be put at serious risk.

The regular use of biologic indicators, inserted with the load during a regular sterilization procedure, will determine if a sterilization unit is functioning properly. These indicators consist of paper strips inoculated with spores of *B. subtilis* and/or *B. stearothermophilus*. Sterilization is considered to have occurred when the paper strips fail to produce viable bacteria in recovery medium.

Both the American Dental Association and the Centers for Disease Control recommend the routine spore testing of dental office sterilizers. These procedures have been made a legal requirement in Ohio and Indiana.<sup>3,4</sup> The purpose of this study is to evaluate the effectiveness of steam, chemical vapor, and dry heat sterilizers, over a three-year period, using biological monitors.

### Materials and Methods

#### Biological Monitor

Biological indicator spore strips were purchased from AMSCO/Medical Products Division (Erie, Pa.). The spore strips contained both *B. stearothermophilus* (ATCC 12980 – mean strip recovery between various lots  $1.2 \times 10^4$  and  $2.2 \times 10^4$ ) and *B. subtilis* (globigii) (ATCC 9372 – mean strip recovery between various lots  $1.3 \times 10^6$  and  $2.1 \times 10^6$ ). Twenty-four spore strips (12 tests/one year) were sent to the dental offices which subscribed to the sterilization monitoring service. The offices were instructed to monitor their sterilizers on a monthly basis. In order to carry out a test, one of the supplied strips was placed in the same type of sterilizer bag or package normally used in the practice for sterilizing instruments. The test bag was then placed in the centre of a normal load and processed using the dental office's standard operating procedures. A second, untreated strip was set aside to be used as a positive control. After the test, the two



**TABLE I:**  
**Sterilizer Failures**

|                      | Number of Tests | # Failures | % Failures |
|----------------------|-----------------|------------|------------|
| Chemiclaves          | 3,114           | 154        | 4.9        |
| Steam Autoclaves     | 1,190           | 27         | 2.3        |
| Dry Heat Oven        | 275             | 20         | 7.3        |
| Total                | 4,579           | 201        |            |
| Overall Failure Rate |                 |            | 4.4        |

**TABLE II:**  
**Causes of Failure**

|                    | Chemiclave | Steam Autoclave | Dry Heat Oven |
|--------------------|------------|-----------------|---------------|
| Mechanical Failure | 20 (13%)   | 7 (26%)         | 2 (10%)       |
| Operator Error     | 30 (20%)   | 8 (30%)         | 10 (50%)      |
| Undetermined       | 104 (67%)  | 12 (44%)        | 8 (40%)       |

spore strips were returned by mail to the sterilization monitoring service and the efficiency of the practice's sterilization procedure was evaluated. This study tested 4,579 sterilizer loads. The types of sterilizers used in these tests were chemiclaves (66 per cent), steam autoclaves (27 per cent), and dry heat ovens (seven per cent).

### Culturing Procedures

On arrival at the university, the spore strips were removed aseptically from the sealed packages and transferred to 17 x 100 mm tubes (Falcon) containing five mL BBL Trypticase Soy Broth. The strips were then incubated for seven days at 37° C (for dry heat sterilization) or at 55° C (for steam or chemiclave sterilization).

The tubes were observed daily. The presence of turbidity was indicative of bacterial growth. Sterilization was considered to have occurred when the positive control strip demonstrated bacterial growth and the test strip demonstrated no growth. Sterilization was considered to have failed when both the positive control strip and the test strip demonstrated bacterial growth, and the growth in the test strip was determined to be Gram-positive bacilli by Gram stain and microscopic observation.

Replacement strips were provided to dental offices whose sterilizers had failed during a routine run, and a follow-up was carried out by each practice. This evaluation included an assessment of: the time and temperature of the sterilization procedure; the seal on the door

gasket; the use of impermeable bags, wraps, or containers; the sterilizer load; a blockage of vents or lines; the use of a non-recommended sterilizing solution (chemiclave); and a malfunction of the gauges or controls.

### Results

This study tested 4,579 sterilizer loads, over a period of three years, from dental offices subscribing to the sterilization monitoring service. As can be seen in **Table I**, the failure rate for chemiclaves was 4.9 per cent, steam autoclaves 2.3 per cent, and dry heat ovens 7.3 per cent. This represented an overall failure rate of 4.4 per cent.

Each failure was investigated with the corresponding dental operatory staff, and its possible causes were noted. This follow-up revealed that the causes for failure could be broken down into specific groups, as shown in **Table II**. In the case of chemiclaves, the majority of failed tests (67 per cent) could not be attributed to either mechanical failure or an identifiable operator error. However, in the case of both steam autoclaves and dry heat ovens, the causes of the failed tests could be fairly equally distributed between an undetermined group and a group for which a definitive cause had been identified (chiefly mechanical failure or operator error).

### Discussion

The importance of sterilization in dentistry cannot be overemphasized, as

the continual reuse of instruments is a potential vehicle for the spread of infectious disease.

In the dental office, the purpose of sterilization is the total destruction of all microbial life on the instruments to be used. This study was undertaken to evaluate the effectiveness of the sterilizers commonly used in dental practice, as well as to document, where possible, the reasons for sterilization failure. Biological indicators were used to complete this evaluation. Twenty-four spore strips were sent to the dental offices which subscribed to the sterilization monitoring service. The service now includes 502 dental offices. During the course of the study, these offices tested their sterilization units once a month. The results represent 4,579 sterilization tests and demonstrate a 4.4 per cent overall failure rate. Chemiclaves were the most common type of sterilizer tested, and displayed a 4.9 per cent failure rate. The other two sterilizers tested were steam autoclaves (2.3 per cent failure) and dry heat ovens (7.3 per cent failure). The rate of sterilizer failure found in this study was similar to that reported by Scheutz and Reinholdt,<sup>5</sup> 2.3 to 7.3 per cent, but was considerably lower than that found in several other studies, 15.1 per cent,<sup>6</sup> 15.6 per cent to 47.5 per cent,<sup>7</sup> 24.6 per cent,<sup>8</sup> 10 per cent to 25 per cent,<sup>9</sup> and 51 per cent.<sup>5</sup> The explanation for this discrepancy may lie in two areas. First, several of these studies were completed when infection control was not as significant an issue for dental practitioners as it is now, and more infection control measures are being practised today. Second, there is a sample bias in the design of our study. The participating dentists made the decision to join our service on their own accord, and thus do not represent a random sampling of Canadian dental offices. It is likely that such dentists would be more concerned about infection control than dentists who do not subscribe to a service, and consequently would take greater care in the instruction of their personnel and the maintenance of sterilizing equipment.

In a majority of cases, the possible causes for the failure of a given sterilization run could not be determined on evaluation. This is not surprising, as the effectiveness of sterilization can be influenced by many factors: the types of instruments in the load, the bulk of the load to be sterilized, the packaging materials used and the arrangement of the load, the sterilizing solution used, the



operation of the sterilizer, and its effectiveness.

The results from the tests conducted on chemiclaves indicate that 50 per cent of these undetermined failures correlated with the use of sterilizing solutions not recommended by the manufacturer of the unit. These observations are only inferential, however, and cannot be used to assign a definitive cause to the failures that were observed.

Infection control has become a major concern for all dental health care professionals. The biological monitoring of operatory sterilizers is the most effective way of reducing the risk of using non-sterile instruments for patient treatment, because it allows defective procedures or equipment to be identified. Appropriate remedies can then be undertaken.

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Dr. J.D. Waterfield is an associate professor in the department of oral biology, University of British Columbia.

Reprint requests to: Dr. J.D. Waterfield, Department of Oral Biology, Faculty of Dentistry, University of British Columbia, Vancouver, B.C. V6T 1Z3.

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## The Ideal Composite Material

Ronald E. Jordan, DDS, MSD  
Makoto Suzuki, DDS, DMD, M.Sc.

Today, thanks to a very confusing "market situation," general practitioners are faced with a daunting task when the time comes to make a differential selection of composite materials. Why? Because of the plethora of composite materials currently available on the market. This situation is further confused by the fact that new composite materials seem to be introduced to the marketplace on a daily basis. So how does one cope with this dynamic and ever changing market situation? Simple! Ask yourself, "How close to the ideal does this new composite material come?"

The most promising composite materials are the "hybrid" systems (see Table I), so called because they are bimodally filled. These materials contain two different types of inorganic filler particles, namely microparticles of .04 microns in diameter and macroparticles of one to five microns in diameter. The hybrid materials are generally more polishable than the traditional coarse-particled composite materials, but slightly less so than the microfilled systems. Since they are generally heavily-loaded inorganically (i.e., 76 to 80 per cent or more by weight), they combine the advantage of reasonable polishability with a high degree of fracture resistance in stress-bearing situations.

The hybrid materials currently dominate both anterior and posterior composite resin restorative dentistry, simply because many hybrids come close to being *ideal* composite restorative materials.

Ten specific features are required in an ideal composite material, namely:

1. Excellent physical properties.
2. High-gloss polishability.
3. Fracture resistance.
4. Color stability.
5. Universal usage.
6. Radiopacity.
7. Extensive shade range.
8. Ease of handling.
9. High viscosity.
10. Clinically proven.

**Excellent Physical Properties:** The



Dr. Ronald E. Jordan

most important physical properties are: high compressive strength (i.e., 50,000 psi); high diametral tensile strength (i.e., 10,000 psi); low water sorption; and low efficient of thermal expansion.

**High-Gloss Polishability:** Composite materials in which the average filler particle size is submicron (i.e., less than a micron) are usually high-gloss, reflectively polishable, and demonstrate a surface topography similar to that of enamel after polishing. Specifically, these include all microfilled materials such as Silux Plus (3M), Durafil VS (Kulzer), Heliomolar (Vivadent) and Perfection (DenMat), as well as hybrids such as Brilliant (Coltene), Herculite XR (Kerr-Sybron), Bisfil M (Bisco), and Prisma APH (Caulk). Promising, highly polishable new hybrid materials include Pertac (ESPE), Charisma (Kulzer) and a new 3M hybrid, Z-100, that will be introduced shortly.

Some hybrid composite materials are not high-gloss polishable, primarily because they have an inorganic filler particle size of greater than one micron. Such materials include Multifil VS, P-50, and Marathon. Accordingly, when high-gloss polishability is required with these materials, it can be achieved by "over veneering" them with microfills such as Durafil VS, Silux Plus or Perfection, which results in a laminated "sandwich" restoration.



Dr. Makoto Suzuki

**Fracture Resistance:** Composite materials that demonstrate a total inorganic filler loading of 75 to 80 per cent by weight or higher are very fracture resistant and can be used with predictable success in high-stress situations. Specific examples include hybrid composite materials (see Table I) such as Bisfil M, Charisma, Herculite XRV, P-50, Prisma APH, Marathon, Pertac and Z-100. Heliomolar also may be used in high-stress situations.

**Color Stability:** Clinical observations carried out over prolonged-term recall periods clearly document the fact that visible light-cured materials are highly color stable. Indeed, discoloration only occurs with a visible light-cured material if it is grossly abused or under cured.

**Universal Usage:** The ideal composite material should lend itself to use both in the anterior and posterior region. Specific examples of universal composite materials include Herculite XRV, Prisma APH, Heliomolar, Pertac, Charisma and Z-100.

**Radiopacity:** The ideal composite material should have a radiopacity approaching that of silver amalgam. The primary reasons for this relate to safety and, further, because radiopacity facilitates the proper clinical assessment of proximogingival marginal integrity, particularly in class II posterior compos-



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TABLE I:

# Composite Material Ratings re: Ideal Composite Requirement Top Score = 100

| Material                                 | Physical Properties | High Gloss | Fracture Resistance | Color Stability | Universal Usage | Radiopaque | Shade Range | Ease Hand | High Viscosity | Clinically Proven | Average |
|------------------------------------------|---------------------|------------|---------------------|-----------------|-----------------|------------|-------------|-----------|----------------|-------------------|---------|
| Durafil VS (Kulzer)                      | 7                   | 10         | 5                   | 8               | 0               | 0          | 10          | 10        | 10             | 10                | 70      |
| Bisfil M (Bisco)                         | 10                  | 10         | 10                  | 10              | 0               | 10         | 10          | 10        | 10             | 10                | 90      |
| Charisma (Kulzer)                        | 10                  | 10         | 10                  | 10              | 10              | 10         | 10          | 10        | 10             | ?                 | 90+     |
| Herculite XRV (Kerr)                     | 10                  | 8          | 10                  | 10              | 10              | 10         | 10          | 10        | 10             | 10                | 98      |
| Heliomolar (Vivadent)                    | 10                  | 10         | 8                   | 10              | 10              | 10         | 10          | 10        | 10             | 10                | 98      |
| Multifil VS (Kulzer)                     | 10                  | 6          | 9                   | 10              | 0               | 10         | 10          | 10        | 10             | 10                | 85      |
| Multifil VS with Durafil Veneer (Kulzer) | 10                  | 10         | 9                   | 10              | 0               | 10         | 10          | 10        | 10             | 10                | 89      |
| P-50 (3M)                                | 10                  | 5          | 10                  | 0               | 10              | 10         | 10          | 10        | 10             | 10                | 85      |
| P-50 with Silux Plus Veneer (3M)         | 10                  | 10         | 10                  | 10              | 10              | 10         | 10          | 7         | 10             | 10                | 97      |
| Prisma APH (Caulk)                       | 10                  | 9          | 10                  | 10              | 10              | 10         | 10          | 10        | 10             | 9                 | 98      |
| Marathon with Perfection Veneer (DenMat) | 10                  | 10         | 10                  | 10              | 10              | 10         | 10          | 8         | 10             | 10                | 98      |
| Z-100 (3M)                               | 10                  | 10         | 10                  | 10              | 10              | 10         | 10          | 10        | 10             | 8                 | 98      |
| Pertac (ESPE)                            | 10                  | 10         | 10                  | 10              | 10              | 10         | 10          | 10        | 10             | 6                 | 96      |
| Perfection (DenMat)                      | 10                  | 10         | 7                   | 10              | 0               | 0          | 10          | 10        | 10             | 8                 | 75      |

ite restorations.

**Extensive Shade Range:** The ideal composite material should demonstrate at least eight to 10 shades, and the shade range should cover the very light shades used for very young patients right up to the very dark shades that are appropriate for aging patients.

**Ease of Handling:** Composite materials that are injectable by means of compule dispensation lend themselves to efficient, controlled insertion techniques.

**High Viscosity:** High-viscosity "no slump" materials can be shaped, formed, moulded and condensed clinically with a high degree of control. In addition, they are rarely associated with porosity. Sticky free-flow materials, on the other hand, are impossible to form and condense, and are frequently associated with porous defects.

**Clinically Proven:** The ideal composite will have been clinically proven in long-term clinical trials of at least two to three years in duration.

The 10 required features of the ideal composite material may be conveniently adapted to a 10-point composite rating scale, as follows: If each feature is given

a maximum of 10 points, a specific composite material may be rated on the basis of how closely it approaches the ideal rating, i.e. 100 points. **Table I** presents the numerical ratings of a number of composite materials.

The 10-point rating scale represents a simple yet very effective method by which a practitioner can rate any composite material that is currently available on the market or that may be introduced in the foreseeable future.

As **Table I** indicates, hybrid materials such as Prisma APH, Herculite XRV, Bisfil M, Z-100, and Pertac, as well as hybrid-microfilled combinations such as P-50/Silux Plus, Marathon/Perfection, and Multifil VS/Durafil VS, closely approximate the ideal (95-98 points), as does Heliomolar, a microfilled material. Furthermore, in spite of the fact that microfilled materials such as Silux Plus, Durafil VS and Perfection have only moderately high ratings, they are ideally indicated in low-stress situations where maximum polishability and excellent soft tissue response are required, i.e., in class III, class V, and labial restorations. Such microfilled materials are also excellent when used in

combination (as labial veneers) with hybrids such as Multifil VS, P-50, and Marathon.

A large number of microfilled, macrofilled, and hybrid composite materials have already been introduced on the market, and probably many more will follow, in each category, as the result of a highly competitive market situation. Unfortunately, long-term clinical observations have not been carried out on the vast majority of the materials currently available to the profession. The wise practitioner should therefore be highly selective in his or her use of the available materials.

The microfilled materials are especially indicated for protected clinical situations, such as class III and class V labial veneer restorations, and in small class IV situations. The careful practitioner will accordingly keep one acceptable microfilled material and one good hybrid material available for routine use in appropriate situations.

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## Temporomandibular disorders, facial pain and headache following motor vehicle accidents

Joel B. Epstein, DMD, MSD  
Vancouver

### ABSTRACT

*Temporomandibular disorders are known to be a possible sequela of motor vehicle accidents, particularly when flexion-extension injury occurs. This paper recognizes the relationship between cervical injury and dysfunction, and temporomandibular dysfunction and headache. The literature related to motor vehicle accidents, whiplash injury, and temporomandibular dysfunction is reviewed, and the etiology, prognosis and management of the trauma associated with head and neck pain and dysfunction are presented.*

### SOMMAIRE

*On sait que les désordres de l'articulation temporo-mandibulaire se manifestent souvent à la suite d'un accident de voiture, surtout lorsqu'il y a des problèmes de flexion et d'extension. Aussi a-t-on noté un rapport entre les lésions et les désordres cervicaux, les désordres de l'ATM et les maux de tête. Dans cet article, on passe en revue les publications portant sur les accidents de voiture, les traumatismes cranio-cervicaux et les désordres de l'ATM. De plus, on y parle de l'étiologie, du pronostic et de la gestion des traumatismes liés aux maux et aux désordres affectant la tête et le cou.*

### Introduction:

Automobile accidents are the leading cause of serious injuries among people under 36 years of age.<sup>1</sup> In the United States, six million automobile accidents were reported in 1985, resulting in 43,795 deaths and 1.3 million injuries (Communications National Highway Traffic Safety Administration, 1987). Each year, head and neck injuries are the cause of up to 70 per cent of the mortalities that occur as the result of automobile accidents, and 49 per cent

of all head injuries are attributed to motor vehicle accidents (MVAs).<sup>2</sup>

The purpose of this paper is to review the mechanism(s) of injury and its prognosis, as well as to comment on the management of temporomandibular disorders (TMD). A review of the literature related to cervical injury and dysfunction is provided, as there is a recognized relationship between whiplash, TMD and headaches, and because there are very few studies available that are related to post-MVA TMD. The goal is to use the literature to provide useful guidelines for practitioners with regards to the etiology, prognosis, and management of post-MVA head and neck pain and TMD.

### Flexion-Extension Injury

Whiplash injury occurs most frequently in rear-end collisions, but may also occur in other types of accidents, including front or side impacts.<sup>3-6</sup> A rear-end collision typically results in a forward acceleration of the individual involved, while hyperextension of the neck occurs. This may be followed by flexion that is limited by the chin striking the chest or the vehicle, or by musculoligamentous limitation of movement.<sup>7,8</sup>

In an eight-mile-per-hour impact, a two gravity (G) force on the vehicle may result in a five G force of acceleration at the occiput and head.<sup>7</sup> The amount of damage to the vehicle may bear little relationship to the forces applied to the cervical spine or to the injury it sustains.<sup>9</sup>

While the patient may report pain immediately following the MVA, it is more common for symptoms to be delayed for hours, days or longer.<sup>2,10</sup> Symptoms associated with whiplash were reported immediately in just 15-30 per cent of patients presenting to hospital. However, on follow-up, at least 60 per cent reported stiffness and pain.<sup>5</sup>

Furthermore, in nearly half of the patients who reported pain, the symptoms were delayed more than 24 hours, and were therefore not likely to be recorded at a medical visit completed shortly after the MVA.<sup>5,11</sup>

Seat belts can prevent serious injury during an MVA, but their use may be associated with more frequent neck injury.<sup>5</sup> Head restraints will only reduce the risk of whiplash when they are designed and fitted correctly.<sup>12,13</sup>

Whiplash injury causes a stretching of the muscles and ligaments of the neck, resulting in pain and stiffness. These symptoms may extend to the shoulders and interscapular region, resulting in occipital pain and headache.<sup>3,9,14-16</sup> The diagnosis of whiplash is based on the patient's history, symptoms, and the findings on physical examination, and usually excludes fractures of bone, dislocations of the cervical spine and herniation of cervical discs.<sup>9</sup> Whiplash is more common in females than males.<sup>5,6,17-19</sup>

The relationship between whiplash and some features of vascular pain have been described in the literature, which suggests that trauma-precipitated migraine headache occurs in association with whiplash mechanics.<sup>20</sup> The response of patients exhibiting vascular symptoms associated with whiplash to medications used in migraine management provides further support for a relationship between these symptoms.<sup>20-22</sup>

In one study, it was reported that 43 per cent of 146 patients followed up for five or more years had disabilities that continued indefinitely.<sup>17</sup> Another study identified that 59 per cent of patients reported disabilities that interfered with their daily activities, such as work and driving.<sup>6</sup> At one-year follow-up, 22.6 per cent continued to experience intermittent pain, and six per cent had continuous pain. Disabilities persisting for six or more months have been esti-



mated to occur in over 25 per cent of whiplash cases.<sup>18</sup> Another study reported disabilities persisting in 73 per cent of patients.<sup>11</sup> Maimaris, Barnes and Allen<sup>11</sup> reviewed 102 patients more than two years post-MVA. One-third of all patients remained symptomatic at two years. Of those who were asymptomatic, 88 per cent had resolved their symptoms by two months after the MVA.<sup>11</sup> Thus, the persistence of symptoms after more than two months was a poor prognostic sign.

In general, the persistence of symptoms is associated with poor prognosis.<sup>9</sup> Symptoms that persist for more than one year, and have a significant effect on life-style, are associated with a poor prognosis, and include neurologic signs, radiographic changes, and improvement followed by relapse.<sup>5,9</sup> One study<sup>11</sup> that reviewed the factors that may have affected prognosis, and subjected the results to statistical analysis, found the following to be statistically significant: type of collision (rear and front impact), occipital headache, referred symptoms, interscapular pain and backache, abnormal neurology, positive radiology, pre-existing degenerative arthritis, and insurance claims (Table I).

The pain literature has also demonstrated that after six months of chronic pain, previously normal individuals are at increased risk of developing negative personality changes, including depression.<sup>9,23,24</sup> These changes are usually reversible only after a successful outcome of treatment for pain.<sup>25</sup>

It has also been stated that the persistence of symptoms is usually what leads a patient to litigation.<sup>3,10,11,17</sup> This is supported by reports that patients often remain symptomatic after their claims are settled. Furthermore, chronic symptoms are seen in patients not involved in litigation.<sup>3,10,11,17</sup> Indeed, in one review, the average time required to settle a claim was found to be nine months. This had no effect on patient symptoms, which persisted at two years. However, other studies found that litigation and employment status may affect patients with chronic pain.<sup>26-33</sup> These studies of chronic pain indicate that the duration and severity of pain and the response to treatment may be affected by active litigation.

## Temporomandibular Disorders:

### i. Etiology:

Many patients with flexion-exten-

**TABLE I:**

## Whiplash Injury: Prognostic Factors

| Findings                    | Symptomatic (%) | Asymptomatic (%) | P      |
|-----------------------------|-----------------|------------------|--------|
| Rear and front collision    | 26              | 7                | <0.05  |
| Occipital headache          | 34              | 13               | <0.05  |
| Referred symptoms           | 57              | 9                | <0.001 |
| Interscapular pain/backache | 49              | 1                | <0.001 |
| Abnormal neurology          | 33              | 10               | <0.001 |
| Positive radiology          | 26              | 4                | <0.01  |
| Osteoarthritis              | 48              | 12               | <0.001 |
| Insurance claims*           | 57              | 18               | <0.001 |

\*average time to settlement – nine months. No effect was seen on persisting symptoms. (adapted from Maimaris, Barnes, Allen, 1988<sup>11</sup>)

sion injuries develop the signs and symptoms of TMD.<sup>34-48</sup> An association between headache, neck pain, and complaints related to the ear and TMD has been documented.<sup>34,49-56</sup> Moderate to severe trauma, caused by vehicular damage and injury that results in TMD, has been associated with headache and cervical pain.<sup>14,34</sup> Even minor events may elevate pre-existing subclinical conditions to symptomatic levels.<sup>58</sup> However, it is not known whether these symptoms parallel, are additive, or represent different stages of the same process.

Bone fractures of the temporomandibular joint (TMJ) or condyle can occur as a result of an MVA, but are almost always associated with a direct impact to the mandible. Soft tissue trauma to the TMJ or condyle and their associated structures can occur with direct injury, stretching or tearing of the capsule and ligaments, or intra-articular hemorrhage, and may result in capsulitis, arthritis and disk displacement. Both forms of injury could result in TMD.

Acute trauma has been reported to precipitate TMD in one-third to two-thirds of patients presenting with complaints of TMD.<sup>15,34-36,43,45,46,57,58</sup> A review of 64 patients following a severe MVA found that 44 per cent had sustained injuries involving the TMJ – seven were diagnosed with joint sprain, 19 with new joint clicking, nine with limited opening, and 11 with dislocation of the condyle.<sup>15</sup> A history of trauma to the jaw region was assessed in 230 consecutive patients presenting with TMD, and compared to individuals who were not presenting for TMD.<sup>46</sup> Trauma was significantly associated with TMD, including

patients with disk displacement, osteoarthritis, and myalgia.<sup>46</sup> Displacement of the disk and changes in bony anatomy have been shown on computed tomography following trauma.<sup>45</sup> Trauma has been associated with disk displacement, osteoarthritis and myalgia,<sup>58</sup> and it may be the most significant factor associated with the development of the symptoms of TMD.<sup>34,58</sup>

The sequelae of trauma involving the TMJ include intra-articular hemorrhage, traumatic arthritis, and disc displacement. Trauma may cause TMD or complicate its treatment.<sup>41</sup> Multiple events may lead to cumulative effects that cause pre-existing subclinical symptoms to become symptomatic.<sup>46</sup> Injury may lead to irreversible inflammation, particularly in non-treated cases where the normal function of the jaw may not be within tissue tolerance.<sup>46</sup>

In whiplash injury, the mechanism of injury to the masticatory structures is believed to be due to a rapid, excessive opening of the mouth that may occur because the lower jaw does not keep up with the head movement.<sup>42,46,48</sup> This results in the stretching of ligaments and other soft tissues, and may cause intra-capsular signs and symptoms as well as muscular pain. A model to study the jaw, head and neck, and dynamics during whiplash has been developed.<sup>43</sup> The common mechanism of head and neck injury that occurs without direct head impact is hyperextension-hyperflexion of the neck. This occurs very frequently in rear-end collisions,<sup>59</sup> which account for over one-third of city traffic accidents. Nearly 40 per cent of these incidents result in whiplash.<sup>60</sup>

The whiplash syndrome, including



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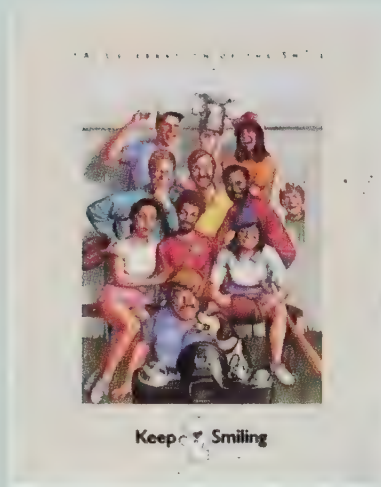
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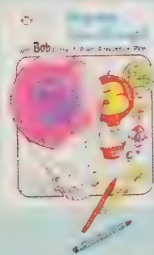
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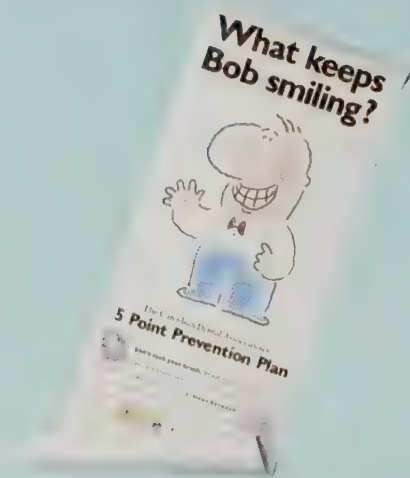
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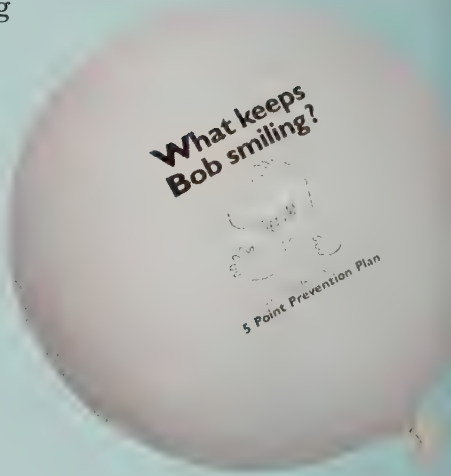
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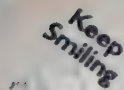
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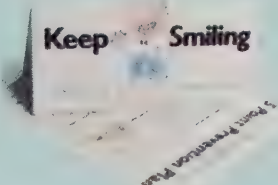


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| Celebration Planning Kit      |          | 4.75                      | 6.50             |       |
| Celebration Poster            |          | 0.95                      | 1.30             |       |
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|             |  |       |        |  |
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Please allow 4-6 weeks for delivery

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TMD, is reported most frequently in individuals between the ages of 30 and 50 years, and occurs more commonly in women (70 per cent) than men.<sup>61</sup> It is believed that the higher incidence of whiplash among women is due to the smaller musculature found in women, resulting in increased vulnerability to whiplash injuries.<sup>62</sup> In most studies, there is a two- or three-fold female-to-male ratio of patients seeking treatment of TMD, while in population surveys the ratio of men to women is fairly equal.

Often, whiplash symptoms are not identified until several weeks or months following an accident.<sup>15,42,43,60,63</sup> A late whiplash syndrome is especially common in women.<sup>63</sup> In one study, the patients presented for evaluation and treatment of TMD four months after an MVA, on average. However, their first awareness of jaw dysfunction came somewhat earlier.<sup>42</sup> The delay in their recognition of TMD may have been the result of these symptoms being ignored initially due to more serious complaints, the area of expertise of the health care provider(s) they attended, or a delayed onset of symptoms, secondary to the dysfunction of adjacent musculoskeletal areas. A further study of the mechanism of injury may indicate whether the jaw movement is too rapid or excessive, resulting in an injury to the soft tissues. Flexion movement could damage the tissues within the joint and result in soft-tissue injury. Secondary muscular forces may also be responsible, with cervical dysfunction leading to the gradual onset of TMD. These mechanisms of intrinsic joint injury have been described in the literature.<sup>42,43</sup>

Some dentists consider the role of occlusion to be important in the etiology of TMD. However, this view has not been supported by well-designed studies of etiology.<sup>64-72</sup> The only factor that appears to have a bearing on the development of TMD is the loss of posterior occlusal support.<sup>73-75</sup>

## ii. Prognosis

The often protracted course of post-trauma TMD symptoms has been documented in the pain literature. Trauma-associated TMD has been reported to respond positively to therapy in only 36 per cent of cases, i.e. those requiring no further treatment, which is in contrast to an 86 per cent positive response rate for non-injury stimulated TMD-patients by 16-44 months of follow-up.<sup>40,41</sup> Only 10 per cent of post-trauma TMD patients were found to be completely symptom-free by the end of the follow-

up period.<sup>40,41</sup> The 64 per cent of post-trauma patients who did not have a positive response required further treatment.

One possible explanation for the protracted course of post-trauma TMD is that the added insult of neck and back injury may complicate recovery. It has been suggested that refractory neck pain may depend upon the management of TMD,<sup>49,54</sup> which may be the case in reverse. The degree of tenderness of the patient's muscles of mastication, and the duration of TMD symptoms on initial presentation for examination, are significantly and directly correlated with the long-term outcome of treatment.<sup>76,77</sup>

Soft tissue injury in the TMJ, related to ligaments, and disk are capable of causing ongoing TMJ pain and dysfunction. These injuries may accelerate degenerative changes in the osseous components of the joint, which have been shown to occur up to seven years after the first acute episode of TMD.<sup>78,79</sup> The prognosis for clicking in trauma-induced TMD has not been studied. However, the long-term prognosis for clicking in multi-factorial caused clicking has been examined.<sup>80-86</sup> In a study of non-painful clicking in cases not due to trauma, it was reported that 70 per cent of patients will eventually develop pain with clicking, and that the use of an oral appliance did not affect the prognosis.<sup>80</sup> The prognosis for the long-term elimination of clicking is poor. This symptom typically resolves in approximately 25 per cent of cases, although the prognosis for pain management is somewhat better.<sup>83-86</sup> Patients with painful clicking may be at greater risk for further progression.<sup>81</sup> In contrast, another study did not demonstrate a progression of non-painful jaw clicking.<sup>82</sup>

If joint surgery is considered as a means of repairing and/or repositioning the TMJ disc, the other problems of muscle pain and splinting must still be addressed. Surgical intervention, while sometimes necessary, results in a joint with less than 100 per cent function, adaptability and stability, even if the surgery is successful. Individuals remain susceptible to a recurrence or exacerbation of previous symptoms following injury to musculoskeletal structures.

## iii. Management

The fact that pain in patients with TMD can be successfully managed with conservative reversible methods is well

documented. Treatment includes care in the use of the jaw, physical therapy, counselling, mandibular guidance appliances, occlusal appliances, anti-inflammatory agents, analgesics and muscle relaxants.<sup>37,39-41,55,71,76,86-111</sup> The effect of occlusal appliances in reducing the pain associated with TMD is well documented in the literature.<sup>37,39,55,71,82-88,90,93,95,96,111</sup> There is no evidence to support the suggestion that structural changes, such as occlusal treatment and surgery, are required in the management of TMD.<sup>39,55,71,83-93,102-104,106,111</sup> If major iatrogenic changes in the dentition and occlusion have been produced, they may require attention, but this only occurs in a minority of cases. Furthermore, there is no evidence to indicate that morphologic changes in the dentition are required in trauma-induced TMD.

It is important to recognize that stress, anxiety, and depression may heighten TMD, and that these symptoms require recognition and management.<sup>39,55,86-93,102-106,108</sup> Chronic pain that persists for more than six months requires a thorough evaluation and appropriate management. Multidisciplinary therapy is often needed, and may include medications appropriate for chronic pain, counselling, physical therapies, and adjunctive treatments that may include relaxation therapies, acupuncture, hypnosis, and biofeedback training.

There is a need for specific research on the TMD that may follow an MVA. The prognosis for TMD due to an MVA may be poorer than in TMD due to other causes. There have been few studies on this subgroup of patients, however.<sup>40-42</sup> The current approach to management must be based on the literature related to cervical dysfunction and the management of TMD in general groups of patients.

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## Subcutaneous emphysema following dental treatment: A report of two cases and review of the literature

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### ABSTRACT

*Subcutaneous emphysema is an uncommonly reported complication of routine dentistry. Two cases are presented, one occurring during root canal therapy and the second during routine restorative dentistry. The etiology and consequences of this phenomenon are reviewed, and the prompt recognition and management of this condition are discussed.*

### SOMMAIRE

*L'emphysème sous-cutané est une affection complexe qu'on rencontre rarement en dentisterie. En voici deux cas, l'un s'étant produit pendant un traitement de canal et l'autre pendant une restauration ordinaire. En plus d'étudier l'étiologie et les conséquences de cette affection, on indique comment la reconnaître rapidement et comment la gérer.*

### Introduction

Subcutaneous emphysema (SCE) of the head and neck spaces occurs when air gains entry into these connective tissue spaces and becomes trapped. The amount of air involved, as well as its anatomical distributions (or localizations), determines the extent and the possible complications of the resulting emphysemic states.<sup>1-3</sup>

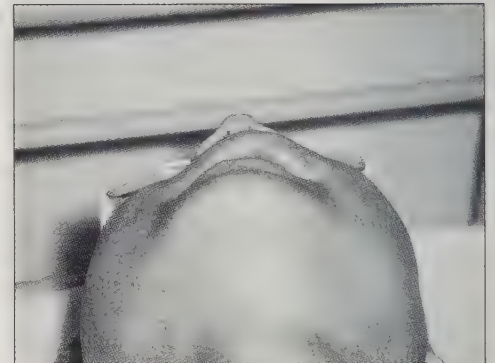
The SCE produced by dental treatment is usually characterized by a unilateral swelling of the face and/or neck, which occurs rapidly with or without the presence of crepitus and is variably associated with pain. This condition has been reported following operative dentistry,<sup>4-11</sup> periodontal surgery,<sup>12-14</sup> tooth extractions,<sup>15-19</sup> endodontic therapy,<sup>20-23</sup> implant surgery,<sup>24</sup> facial fractures,<sup>25-26</sup>

and orthognathic surgery.<sup>20-23</sup> Other causes have also been reported, such as coughing, sneezing, blowing the nose or vomiting after dental extractions.<sup>1,3</sup>

An uncommon complication, SCE can be quite frightening to both the patient and the dentist. Although this event usually resolves without incidence, serious complications have been reported in the literature. Thus, the dental practitioner should be aware of the recognition and treatment of SCE. The following case reports exemplify its common clinical features.

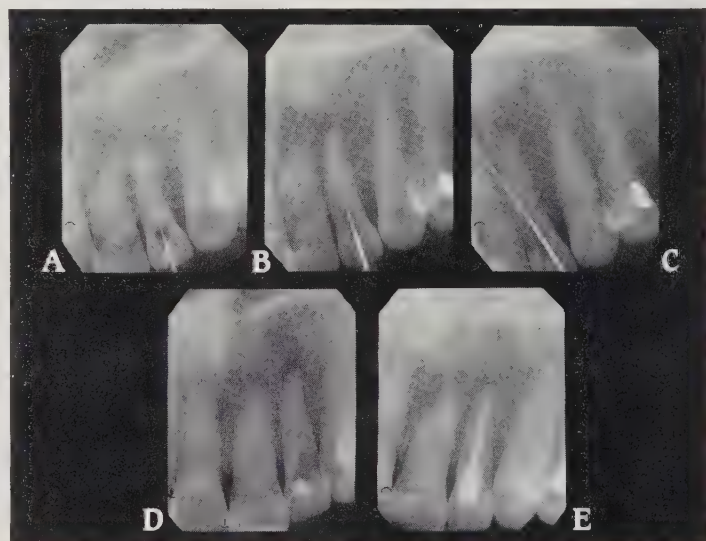
### Case Report One

A 67-year-old oriental male with a large facial swelling, which had occurred suddenly during routine endodontic treatment, was brought to the emergency department by his family dentist (Fig. 1). The patient's medical history was noncontributory. However, the history of his present condition indicated that during a root canal therapy of tooth 22, the root was inadvertently



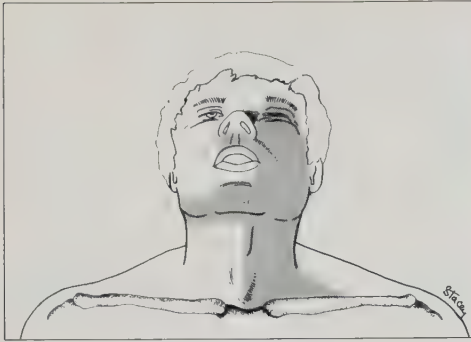
**Fig. 1:** Submental view of Case 1 following endodontic injury. Note asymmetry of left lip and cheek.

perforated labially with a number 25 K file, piercing the gingiva and penetrating the inner aspect vestibule of the upper lip (Fig. 2). Bleeding occurred within the canal secondary to the perforation. The blood was removed by irrigation (possibly with five per cent sodium hypochlorite) and compressed air. This resulted in an immediate but painless swelling of the left side of the pa-



**Fig. 2:** Radiographs of endodontic injury to tooth 22: (A) initial X-ray; (B) trial file; (C) a #25K file perforating labially; (D) at presentation in hospital dental clinic; (E) completed root canal therapy six weeks later.





**Fig. 3:** Distribution of the SCE in Case 1.

tient's face and neck.

On physical examination, the patient was alert, oriented and afebrile. Vital signs were within normal limits. He had a marked left facial swelling extending from the left orbit to the submandibular and supraclavicular areas, which crossed the midline in the submental region (Fig. 3). On palpation, there was marked crepitus over the entire area of the swelling. Oral examination indicated an apparent puncture of the gingiva in the left vestibule over the apex of tooth 22. No air was expressed from the wound and the trachea remained in the midline without a shift. The remainder of the physical exam was within normal limits.

The patient was assessed as having a dental procedure-induced subcutaneous air emphysema. However, sodium hypochlorite solution could not be ruled out as a possible cause of the swelling, as it may have been forced into potential connective tissue spaces during irrigation. The patient was admitted to hospital for observation and was treated with aqueous sodium Penicillin G, two-million units IV every six hours (q6h). Mild analgesics were prescribed for pain following the closure of the access opening in tooth 22. Routine laboratory investigations were normal, and the patient's hospital course was uneventful except for a spiking of his temperature to 38.4 degrees C on day two. The swelling gradually reduced in size and distribution over a three-day hospitalization period.

At the time of his discharge, the patient was asymptomatic. He was prescribed penicillin for one week and advised to return to the clinic in three days for further evaluation.

At the initial follow-up visit, the patient demonstrated a marked reduction in the size of the swelling, but slight crepitus remained. A six-week follow-up demonstrated complete resolution of



**Fig. 4:** Frontal view of Case 2. Note asymmetry of left side of face.

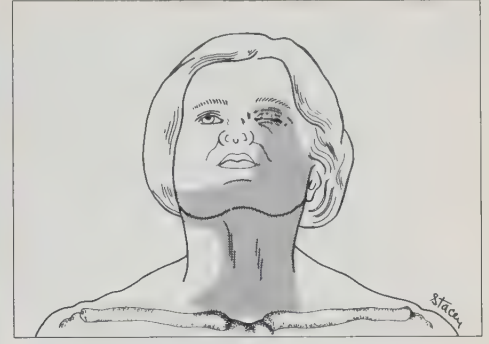
the swelling and crepitus, and the tissues had healed completely. The root canal therapy was completed by an endodontist without further complication (Fig. 2). A further six-month follow-up has demonstrated no need for endodontic surgical treatment.

### Case Report Two

A 43-year-old caucasian female with a large facial swelling, which had occurred suddenly during routine restorative treatment, was referred to the emergency department by the family dentist (Fig. 4). The patient's medical history was noncontributory, except that she had an allergy to penicillin. During the preparation of a large subgingival Class V lesion on the buccal of tooth 46, the buccal mucosa was inadvertently nicked near the commissure of the lips. The dentist stopped drilling to allow the bleeding at the injury site to subside. Subsequent to resuming drilling, however, a rapidly-developing painless swelling of the left side of the face and neck, which extended up from the left eye (completely closing it) to the supraclavicular area, was observed (Fig. 5).

On examination, the patient was asymptomatic with normal vital signs. Crepitus was palpable in the left neck area and on oral examination there was a large subgingival preparation on tooth 46 with floppy gingival tissues and a small puncture wound in the buccal mucosa.

The patient was given prophylactic antibiotic coverage, erythromycin, for a week, along with mild analgesics for pain. A follow-up examination three



**Fig. 5:** Distribution of the SCE in Case 2.

days later revealed a significant decrease in swelling and no discoloration. The patient could open her eye without difficulty. Crepitus was still evident in the cheek and neck areas on palpation. The patient reported mild discomfort over the first two days. A week later, the swelling had resolved with no further symptoms.

### Discussion

As reported in the literature, SCE can occur subsequent to a variety of dental procedures, two of which have been depicted: operative dentistry and root canal therapy. The entry of air into the tissues occurs following a breaching of the integument, usually in conjunction with the use of a compressed air-water syringe and/or high-speed air turbines. In many of these cases, it seems that drying or clearing of the operative fields is reported just prior to the development of the emphysema. The high-pressure air simply enters the tissues and inflates the potential fascial planes. On palpation of the inflated areas, crepitus is usually elicited. If it is not noted immediately, it develops shortly thereafter.

The differential diagnosis for an immediate cerviofacial swelling occurring during dental procedures should include anaphylaxis, angioneurotic edema, hematoma and SCE. Anaphylaxis is far more severe in all aspects than SCE, with the skin manifestations preceding serious cardiorespiratory manifestations. In angioneurotic edema, circumscribed areas of edema appear, and are usually preceded by a burning sensation on the skin or mucous membrane. Hematoma may occur rapidly, but while a degree of pain and sponginess may be associated with its development, there will be no crepitus.

Pain seems to be quite variable with SCE. The patients seem to feel "a sense of enlargement" and mild discomfort rather than outright pain. Analgesia is



prescribed in most reported cases, but the duration of pain was not quantified. The two cases in this report required very little analgesia.

In case number one, SCE can be differentiated from a possible reaction to sodium hypochlorite being forced through the apex during the root canal therapy by its resultant sequelae, which include symptoms of acute and extreme pain, edema and hematoma formation, as sodium hypochlorite possesses potent tissue dissolution properties.<sup>28</sup> Although the family dentist was not sure that sodium hypochlorite had infiltrated into the tissues, this event is unlikely, as the patient did not experience the intense pain or hematoma formation associated with sodium hypochlorite. The patient was treated conservatively.<sup>29-39</sup>

Intuitively, in these types of cases, it might be expected that oral bacteria would be forced into the subcutaneous tissue planes of the face and neck from the wound or root canal, setting up potential infection. However, in an early review of 45 cases of SCE, Shovelton<sup>31</sup> reported no infectious complications. He therefore proposed that prophylactic antibiotic coverage was unnecessary. A more recent review of an additional 25 reported cases of SCE, by Kullaa-Mikkonen and Mikkonen,<sup>32</sup> documented two complications, an infection and a mediastinitis, which resulted in death.

Although SCE is generally considered to be innocuous, it has been implicated in the death of a patient undergoing endodontic treatment (the cause of death being consistent with an air embolism). Rickles and Joshi<sup>20</sup> were able to reproduce this phenomenon experimentally in a canine model, where four of seven dogs died of air embolism after the introduction of pressurized air into root canal-treated anterior teeth. Thus, any patient with marked SCE should be referred to a hospital for assessment and treatment. Air could migrate down the neck to deeper structures, causing respiratory difficulty, and/or enter the mediastinum, possibly causing death due to cardiorespiratory changes.

Feinstone<sup>13</sup> reported a case where an infected SCE of the mandible occurred following periodontal treatment and the use of a home water-jet spray device in the patient's oral hygiene regimen. Thus, as a preventive measure against the possibility of forcing oral bacteria deep into connective tissue planes, patients should be placed on prophylactic antibiotic coverage.<sup>33,34</sup>

## Conclusion

SCE can be alarming to both the patient and the dental practitioner. Thus, the dentist should be aware of this complication. The use of excessive high-pressure air to dry canals and operating fields during extractions should be avoided. Instead, the instrumented canals should be dried with paper points and extraction sites irrigated with water only (a hand-held syringe should be used, where possible, to avoid any high pressure air). Patients should also be warned about excessive blowing or rinsing following extractions, because of the possibility of SCE. Recognition and prompt management of the condition are essential, as it is not without its potential complications. Most cases resolve uneventfully, however. The majority of patients with SCE can be treated conservatively with antibiotic and analgesic coverage on an out-patient basis, and close post-operative follow-up care. However, hospitalization may be considered if a marked SCE exists in conjunction with accidentally-injected irrigating solutions, the presence of a concurrent infection and, especially, if cardiorespiratory problems arise.

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**Note:** *These cases presented themselves to the Toronto Western Dental Clinic as emergencies while Drs. Pynn and Amato were dental interns at the hospital.*

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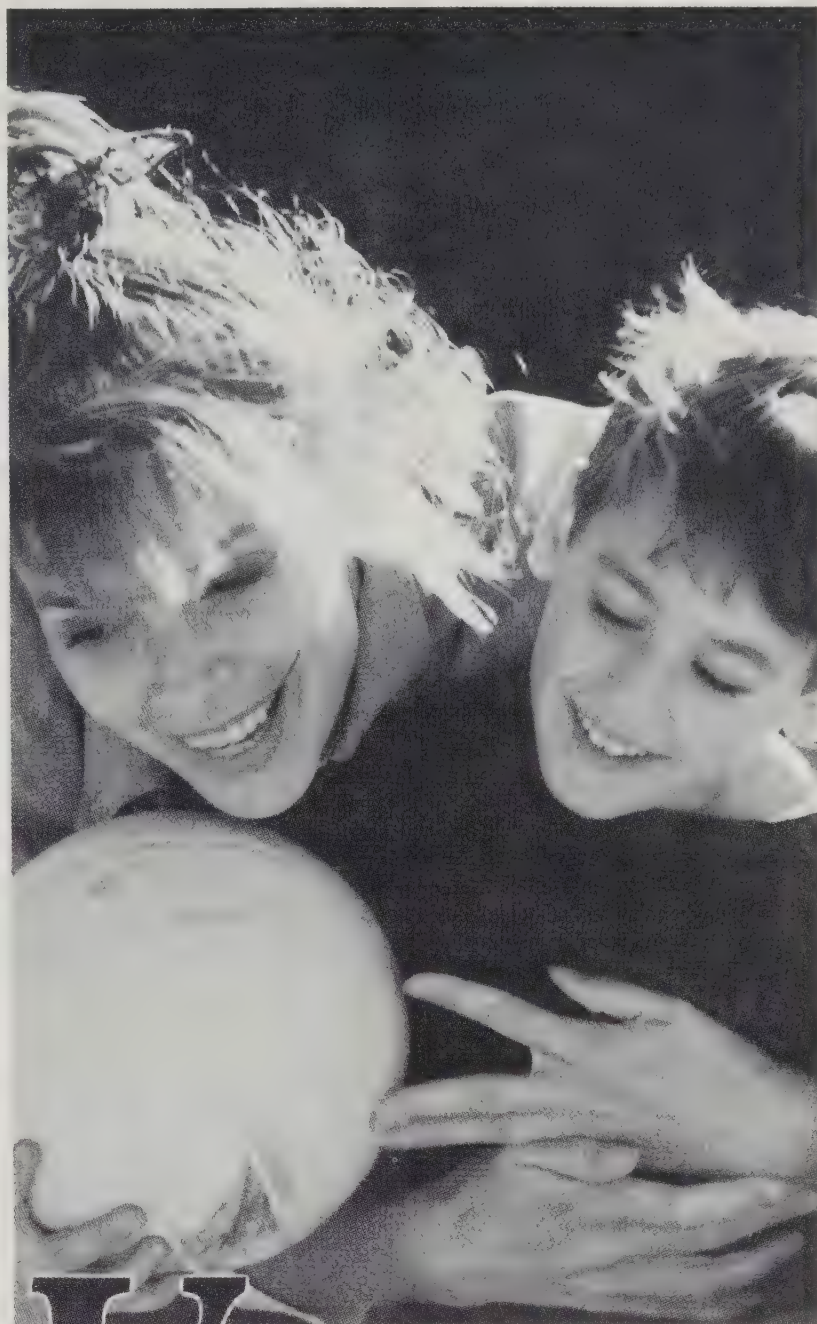
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*Standing at this point, the pioneers, who have worked and prayed, sometimes under great discouragement, but with dogged persistence, look ahead with confidence, feeling that foundations sure and strong have been laid upon which a lasting structure will be build. We pass it on to you younger men, knowing that the meeting at Ottawa, 1920, will always be a landmark and a new starting point."*



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## Longevity of partial, complete and fixed prostheses: A literature review

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### ABSTRACT

*A review of the dental literature reveals a lack of consensus as to the longevity of conventional prosthodontic therapy. The reasons for this are suggested and best estimates of the longevity of partial, complete and fixed prostheses are presented based on the available literature. A renewed interest in survival studies, hopefully based on sound parameters that outline the reasons for failure, as well as replacement indicators, is required to update our knowledge of survival rates.*

### SOMMAIRE

*Lorsqu'on examine les publications à ce sujet, on découvre un manque de consensus touchant la longévité des prothèses ordinaires. Dans cet article, on cherche à expliquer pourquoi et, documentation à l'appui, on donne les meilleures estimations de longévité pour les prothèses partielles, complètes et fixes. Pour mieux connaître leurs taux de survie, il conviendrait qu'on fasse des études à l'aide de paramètres sûrs déterminant les raisons des échecs et les indices de remplacement.*

Every dentist should realize that the restoration of oral function and health, and their preservation, are the primary goals of all prosthodontic treatment. The significance of being able to predict the prognosis of prosthetic treatment and the service life of an actual prosthesis should also be evident. Many dentists may not feel confident in making this prediction. However, with the current, rapid advances in the areas of dental materials and implantology, it would seem reasonable to assume that the dental profession would be able to accurately predict the longevity and prognosis of common dental techniques and prostheses — the cornerstone of modern dentistry.

Although information concerning the average service life of common pros-



Fig. 1: A malaligned peg-shaped maxillary lateral incisor in a 24-year old patient



Fig. 2: The same lateral incisor shown in Fig. 1, three years after crown buildup with hybrid composite Prisma APH

theses is available, it is difficult to compare these studies or to make accurate predictions on longevity. Furthermore, the conclusions derived from literature sources are necessarily dependent on the nature of the study and on the analysis that was carried out on the

gathered data. This often leads to confusion and misinterpretation, as the results obtained through objective methods of assessing longevity, such as longitudinal studies, are difficult to compare with the findings of more subjective studies, which recount practice ex-



perience or practitioner expectation. The main reasons for the absence of reliable scientific data are: a lack of standardization in methods and analyses, and a lack in the development of reliable success and failure indications.

This problem has been recognized in the current literature, and, hopefully, its rectification has been initiated. Leempoel et al<sup>1</sup> list the four types of survival studies as: clinical studies, laboratory studies, practice experience studies, and literature studies, and aptly outline the problems involved in the analysis of existing data. The conclusion of the Leempoel article is that survival studies are a necessary and acceptable method of evaluating the longevity of dental restorations, provided that an appropriate analysis is applied to the data in order to achieve the standardization required for study comparison.

Unfortunately, the standardization of methods and analysis, and the use of reliable indicators of success and failure, are not yet evident in the literature. The intent of this review is to consolidate the results of previously published studies in an attempt to determine the expected longevity of the common prostheses, namely removable partial dentures, complete dentures and fixed bridgework.

## The Longevity of Removable Partial Dentures

Although early studies had indicated that removable partial dentures (RPDs) were associated with a high incidence of periodontal disease and caries,<sup>2-4</sup> it has been shown conclusively that with sound preventive measures, good oral hygiene, and patient co-operation, caries and periodontal disease can be arrested or kept to a minimal level.<sup>5-9</sup> To date, the parameters that have been studied in relation to RPD and oral disease include: oral hygiene, gingival inflammation, bone level, caries, and prosthetic factors.<sup>2-9</sup>

The results indicate that little or no change in these parameters takes place in the presence of an RPD if adequate plaque control is carried out by the patient. An adequate oral hygiene program has been shown to keep plaque at a low level,<sup>5,7-9</sup> and with adequate plaque control, the forces transmitted from the RPD to the abutment teeth are well tolerated and do not induce periodontal disease. This has been shown by the low incidence of both bone loss and mobility of the abutment teeth after long-term RPD use.<sup>8,9</sup>

Published studies on the longevity of RPDs are difficult to compare because of substantial differences in the parameters explored, the duration of the studies, and the indicators of success. Derry and Bertram<sup>5</sup> found that 91 per cent of patients were still able to wear RPDs after two years. Schwalm et al<sup>6</sup> found that 93 per cent were wearing RPDs satisfactorily after two years. A five-year study by Kratochvil et al<sup>9</sup> would seem to indicate that satisfactory RPDs were still in place at five years. A 10-year study by Berman et al<sup>8</sup> found that the service time, the period from placement to replacement, was eight years, with over 50 per cent of RPDs still in service after 10 years. Chandler and Brudvik,<sup>10</sup> in a follow-up of the group of patients originally reported by Schwalm and his colleagues,<sup>6</sup> reported a reasonable service life of eight to nine years.

A removable partial denture that is properly designed and fabricated, coupled with patient compliance in regard to oral hygiene, will not pose a risk to abutment teeth or tissues. The two-year success rate is high, but service time will decrease rapidly if oral hygiene is poor and regular follow-up care is not provided.<sup>2-6</sup> Based on the Bergman et al<sup>8</sup> and Chandler and Brudvik<sup>10</sup> studies, a prediction of an optimum RPD longevity of eight to 10 years would not be unreasonable, provided that regular recalls and adjustments of the prosthesis are carried out.

## The Longevity of Complete Dentures

Emphasis has been placed on assessing the perceived versus the actual denture replacement needs of the edentulous population. Studies indicate that the perceived need of the edentulous patient is not an accurate indication of actual need, as determined by professional judgement.<sup>11-15</sup> MacEntee<sup>16</sup> indicated that, in Western societies, more than 20 per cent of the population over 18 years of age is edentulous, and greater than 50 per cent of denture wearers are in need of some dental treatment related to denture wear. But where individuals of 65 years old and over are concerned, the age of the dentures worn is typically 10 years plus. Most members of this population group are having problems related to denture wear, yet are unlikely to seek treatment or even to be aware of the need for treatment.

Studies have also investigated the number of years that a set of dentures is worn. Bergman and Carlsson<sup>13</sup> found

that 20 per cent of denture wearers had worn dentures for 20 years, while Kail and Silver<sup>14</sup> found that 61 per cent had worn dentures for over 10 years, 32 per cent had worn dentures for over 20 years, and 22 per cent for 11-20 years.

Similarly, Burgess and Beck<sup>17</sup> found that 62.3 per cent of patients over 60 years of age had worn dentures for over 10 years. Mersel et al<sup>12</sup> found that 34 per cent had worn dentures for over 20 years and 10 per cent had worn dentures for 10-20 years. (These studies do not indicate the relationship between the age of the prosthesis and the need for replacement.) Smith and Sheiham<sup>18</sup> assessed 182 denture wearers for fit and retention and found that only 10 per cent of the patients had appliances that were satisfactory in both aspects. No mention was made as to the age of the prostheses. Ritchie<sup>19</sup> reported that 37 per cent of 206 patients had dentures more than 10 years old, and that 80 per cent of these prostheses were unsatisfactory. A more recent study by Ellinger<sup>20</sup> judged fit, adaptation, and tissue health to be acceptable for 26 patients at a 20-year follow-up. However, the criteria for acceptability were not stated in the article.

An accurate means of denture assessment is required to determine if a prosthesis actually needs replacement. It has been suggested that the age of a denture could be used as an indicator of replacement need, a concept that was applied in a recent study by Hoad-Reddick et al.<sup>21</sup> They concluded that, five years after insertion, 40 per cent of dentures need replacement, and 80 per cent will need replacement after 10 years.

An important point raised by these studies is the correlation between the age of a denture and the actual versus the perceived need to replace it. Denture patients typically perceive the need for denture replacement to be far below the actual need, as assessed by dental professionals. In addition, although the incidence of oral disease and the need for replacement increase with the age of the patient and the denture, the patient will actually perceive this need to have decreased.<sup>12,16</sup> If patients are not aware of the need for regular recall and replacement of their prostheses, and consequently of the potential and actual damage that ill-fitting dentures can cause to their health, then the onus clearly lies on the dentist to educate the edentulous patient on this matter. As published studies indicate that one-third of the edentulous population has dentures



that are 20 years old, and if Hoad-Reddick's finding of an 80 per cent need for replacement at 10 years is applied, the indication is that a significant need exists in society for the replacement of complete dentures. This is a need that hasn't been adequately recognized or met.

Based on published data, an assessment of denture quality is recommended on a regular, yearly basis, and a prediction of 10 years, maximum, of optimal service is reasonable. Recently, a denture-quality scale was developed to provide a means of correlating data from denture studies.<sup>22</sup> Indications are that this scale could be adapted to clinical use, as it seems simple to use and shows acceptable reproducibility. Its developers, Vervoorn et al,<sup>22</sup> rated variables on a numerical scale to arrive at a sum or total score that could be used to assess the quality of a prosthesis.

The variables studied included: dislodgement of the maxillary or mandibular denture by moderate opening; rotation of a midline more than three millimetres when rotating the denture while pressing lightly against supporting tissues; making contact on the contralateral side when a cotton roll was introduced between premolars on one side; and the existence of freeway space of more than five mm or less than one mm. The above variables were rated as, No = 0, Yes = 1. Other variables, rated as No = 0, light to moderate = 1, and severe = 2, were: existence of an occlusal interference between intercuspal position and centric occlusion; at least three-point contact between maxillary and mandibular dentures in centric occlusion; and an occlusal interference when moving from retruded contact to intercuspal position.

The simplicity of the scale and the numerical score derived from its use should improve the accuracy of comparisons in survival studies, and could also aid the clinician in the objective assessment of a patient's dentures.

## The Longevity of Fixed Partial Dentures

There is a perceived need for more information on the longevity of fixed restorations, as this data could lead to:<sup>23</sup> an effective allocation of limited resources, accurate evaluation of new technology, and establishment of minimum clinical standards for length of service. Although longevity is only one factor influencing a patient's decision to undertake fixed bridgework, a low life

expectancy, coupled with the perceived high cost of the prosthesis, may outweigh the patient's perceived benefit from the work.

There is a definite lack of research on the life expectancy of fixed restorations or the reasons for their failure. The few studies that have been reported use different standards or indicators of success, which makes comparison between the studies and their conclusions difficult to assess. A review of the literature dealing with the longevity of fixed restorations follows.

Schwartz et al<sup>24</sup> found a mean service time of 10.3 years, with more than 20 per cent of restorations failing within three years. Roberts<sup>25</sup> reported on bridges placed over a 12-year period and found a failure rate per year which varied from 0.5 per cent for posterior full crowns to a high of eight per cent for class II inlays used as bridge abutments. Roberts,<sup>26</sup> in another study, investigated the failure rate of bridges in relation to age of the patient at insertion, and found a failure rate of two to six per cent per year, depending on the age of the patient at insertion. Glantz et al<sup>27</sup> found, in a five-year follow-up, that only two per cent of the restorations had been lost and that 90 per cent of the crowns and pontics were rated as satisfactory at five years. Leempoel et al<sup>28</sup> evaluated fixed restorations placed during an 11.5-year period, and found a total of only 1.9 per cent failure over that period. Using a Kaplan-Meier method of estimation, Leempoel estimated that the number of restorations that would be present after 11 years ranged from 75 per cent for jacket crowns to 95-97 per cent for full, partial and porcelain-fused-to-metal crowns. Karlsson,<sup>29</sup> in a 10-year follow-up study, found that 93.3 per cent of the bridges were still functioning, although 12.6 per cent had a loose retainer, which may predispose those bridges to failure in the future. Walton<sup>30</sup> found the mean length of service of fixed restorations to be 8.3 years, with a range of 6.3 years of service for ceramic metal crowns to 14.7 years for resin veneer crowns.

From available data, indications are that at 10 years after the insertion of fixed restorations, approximately 90 per cent will still be in service. The mean length of service is in the eight to 11 year range. This is in agreement with a study by Maryniuk,<sup>23,31</sup> who surveyed practising dentists concerning their expectations and observations of restoration longevity. He concluded that, based on the average and minimum acceptable

values given by the respondents, a minimum longevity range for fixed restorations was eight to 13 years.

## Summary

It is difficult to compare longevity studies due to the relatively low number of published reports and the different parameters studied by the various authors. Renewed interest in restoration longevity, reason for failure and indicators for replacement will hopefully result in more published data. The importance and need for valid scientific data have been established in the literature.

An interpretation of the available published data indicates that a longevity prediction for common prosthetic procedures is, at best, only an estimate. The predicted service life, as indicated by the literature, is eight to 10 years for removable partial dentures, five to 11 years for complete dentures, and eight to 11 years for fixed restorations.

Reliable indicators, or scales, to evaluate the need for replacement and aid in data analysis are currently available, and should be considered by investigators interested in contributing to our knowledge of survival rates.

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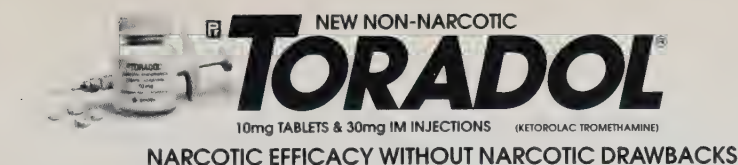
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TORADOL (ketorolac tromethamine) 10 mg tablets  
TORADOL IM (ketorolac tromethamine) 15 mg/mL and 30 mg/mL intramuscular injections

## Therapeutic Classification

Analgesic Agent

## Action

Toradol (ketorolac tromethamine) is a non-steroidal anti-inflammatory drug that exhibits analgesic activity. Its mode of action is to inhibit the cyclo-oxygenase enzyme system, thereby inhibiting the synthesis of prostaglandins, and is considered to be a peripherally acting analgesic. At analgesic doses it has minimal anti-inflammatory and antipyretic activity. Ketorolac tromethamine is rapidly and completely absorbed when administered by both the oral and intramuscular routes, and pharmacokinetics are linear following single and multiple dosing.

Steady state plasma levels are attained after one day of Q.I.D. dosing. Based only on pharmacokinetic principles, a faster attainment of the steady state plasma level might be achieved with a loading dose of about twice the maintenance dose. This occurs when the dosing interval is approximately equal to the drug's half-life.

Following oral administration, peak plasma concentrations of 0.52 to 1.31 mcg/mL occurred 35 minutes after a single 10 mg dose. The terminal plasma elimination half-life ranged between 4.1 and 6.1 hours in healthy adults, while in elderly subjects (mean age: 72 years) it ranged between 3.0 and 6.1 hours. A high fat diet decreased the rate but not the extent of absorption of oral ketorolac tromethamine, while antacid had no effect.

Following intramuscular administration, peak plasma concentrations of 2.2 to 3.0 mcg/mL occurred an average of 50 minutes after a single 30 mg dose. The terminal plasma half-life ranged between 3.8 and 6.3 hours in young adults and between 4.4 and 8.6 hours in elderly subjects (mean age: 72).

The primary route of excretion of ketorolac tromethamine and its metabolites (conjugates and the p-hydroxy metabolite) is in the urine (91.4%) and the remainder is excreted in the feces.

More than 99% of the ketorolac in plasma is protein bound over a wide concentration range.

## Indications

Orally administered Toradol (ketorolac tromethamine) is indicated for the short-term management of mild to moderately severe pain, including post-surgical pain (such as general, orthopedic and dental surgery), acute musculoskeletal trauma pain and post-partum uterine cramping pain.

Intramuscular injection of Toradol is indicated for the short-term management of moderate to severe pain, including pain following major abdominal, orthopedic and gynecological operative procedures.

## Contraindications

Toradol (ketorolac tromethamine) should not be used where there is a known or suspected hypersensitivity to the drug. Because of the possibility of cross-sensitivity, ketorolac tromethamine should not be used in patients in whom acetylsalicylic acid (ASA) or other non-steroidal anti-inflammatory agents induce acute asthmatic attacks, urticaria, rhinitis or other allergic manifestations. Fatal anaphylactoid reactions may occur in such individuals.

Toradol (ketorolac tromethamine) also should not be used in patients with peptic ulcer or active inflammatory disease of the gastrointestinal system.

## Warnings

Long-term administration of ketorolac tromethamine oral formulation has shown that this drug shares the risks that other non-steroidal anti-inflammatory drugs pose to patients when taken chronically. Peptic ulceration, perforation and gastrointestinal bleeding, sometimes severe and occasionally fatal have been reported during therapy with non-steroidal anti-inflammatory drugs and may occur with ketorolac tromethamine, both in the presence or absence of previous symptoms. Elderly and debilitated individuals are most susceptible to these complications, the incidence of which increases with dose and duration of treatment. Close medical supervision is recommended in patients prone to gastrointestinal tract irritation, particularly those with a history of peptic ulcer, diverticulosis or other inflammatory disease of the gastrointestinal tract. In these cases the physician must weigh the benefits of treatment against the possible hazards.

Patients taking any non-steroidal anti-inflammatory drug including ketorolac tromethamine should be instructed to contact a physician immediately if they experience symptoms or signs suggestive of peptic ulceration or gastrointestinal bleeding. These reactions can occur at any time during the treatment. If peptic ulceration is suspected or confirmed, or if gastrointestinal bleeding occurs, ketorolac tromethamine should be discontinued and appropriate treatment instituted and the patient closely monitored.

Ketorolac tromethamine is not recommended for routine use with other non-steroidal anti-inflammatory drugs because of the potential for additive side effects.

**Use in pregnancy, lactation and labour:** The administration of ketorolac tromethamine is not recommended during pregnancy or lactation.

Ketorolac tromethamine is not recommended for use as an obstetrical preoperative medication or for obstetrical analgesia because of the known effects of non-steroidal anti-inflammatory drugs on uterine contraction and fetal circulation.

**Use in children:** Safety and efficacy in children have not been established. Therefore, Toradol is not recommended for use in children under age 16.

**Use in the elderly:** Because ketorolac is cleared somewhat more slowly by the elderly (See PHARMACOKINETICS) who are also more sensitive to the renal effects of non-steroidal anti-inflammatory drugs, extra caution and the lowest effective dose should be used.

## Precautions

**Renal effects:** As with other drugs that inhibit prostaglandin biosynthesis, elevations of blood urea nitrogen (BUN) and creatinine have been reported in clinical trials with ketorolac tromethamine. Since ketorolac tromethamine and its metabolites are excreted primarily by the kidney, patients with significant impairment of renal function (serum creatinine values greater than 5 mg/dL) should not receive ketorolac tromethamine unless the expected benefits outweigh the risks. In patients with moderately impaired renal function serum creatinine values ranging from 1.9 to 5.0 mg/dL, the rate of ketorolac clearance was reduced to approximately half of normal. The total daily dose of ketorolac tromethamine should be reduced by half in such patients. The disposition of ketorolac in dialysis patients has not been studied.

Patients who are volume depleted because of blood loss or severe dehydration may be dependent on renal prostaglandin production to maintain renal perfusion and therefore glomerular filtration rate. In such situations the use of drugs which inhibit prostaglandin synthesis might be expected to further decrease renal blood flow. Caution is advised if ketorolac tromethamine is used in such circumstances. Close monitoring of urine output, serum urea and serum creatinine is recommended until the patient is normovolemic.

**Hepatic effects:** Meaningful elevations (greater than 3 times normal) of serum transaminases (glutamate pyruvate (SGPT or ALT) and glutamic oxaloacetic (SGOT or AST)) occurred in controlled clinical trials in less than 1% of patients. If clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur (e.g., eosinophilia, rash, etc.), ketorolac tromethamine should be discontinued. Patients with impaired hepatic function from cirrhosis do not have any clinically important changes in ketorolac tromethamine clearance. Studies in patients with active hepatitis or cholestasis have not been performed.

**Fluid and electrolyte balance:** Fluid retention and edema have been observed in patients treated with Toradol. Therefore, as with many other non-steroidal anti-inflammatory drugs, the possibility of precipitating congestive heart failure in elderly patients or those with compromised cardiac function should be borne in mind. Toradol should be used with caution in patients with cardiac decompensation, hypertension or other conditions predisposing to fluid retention.

**Hematologic effects:** Ketorolac tromethamine inhibits platelet function and may prolong bleeding time. It does not affect platelet count, prothrombin time (PT) or partial thromboplastin time (PTT). Patients who have coagulation disorders or are receiving drug therapy that interferes with hemostasis should be carefully observed when ketorolac tromethamine is administered. Unlike the prolonged effects from aspirin, the inhibition of platelet function by ketorolac tromethamine is normalized within 24 to 48 hours after the drug is discontinued.

Blood dyscrasias associated with the use of non-steroidal anti-inflammatory drugs are rare, but could occur with severe consequences.

**Infection:** In common with other anti-inflammatory drugs, ketorolac tromethamine may mask the usual signs of infection.

**Drug Interactions:** Toradol (ketorolac tromethamine) is highly bound to human plasma protein (mean 99.2%) and binding is independent of concentration.

Prothrombin time should be carefully monitored in all patients receiving oral anticoagulant therapy concomitantly with ketorolac tromethamine.

Ketorolac tromethamine does not alter digoxin protein binding.

In vitro studies indicated that at therapeutic concentrations of salicylates (300 mcg/mL), the binding of ketorolac tromethamine was reduced from approximately 99.2% to 97.5%. Therapeutic concentrations of digoxin, warfarin, acetaminophen, phenytoin, tolbutamide and piroxicam did not alter ketorolac tromethamine protein binding. Since ketorolac tromethamine is a highly potent drug and present in low concentrations in plasma, it would not be expected to displace other protein-bound drugs significantly.

There is no evidence in animal or human studies that ketorolac tromethamine induces or inhibits the hepatic enzymes capable of metabolizing itself or other drugs. Hence, it would not be expected to alter the pharmacokinetics of other drugs due to enzyme induction or inhibition mechanisms.

Ketorolac tromethamine mildly reduces the diuretic response to furosemide in normovolemic subjects. Inhibition of renal lithium clearance leading to an increase in plasma lithium concentration and potential lithium toxicity has been reported with some non-steroidal anti-inflammatory drugs. The effect of ketorolac tromethamine on lithium plasma levels has not been studied. Concomitant administration of methotrexate and some non-steroidal anti-inflammatory drugs have been reported to reduce the clearance of methotrexate, enhancing the toxicity of methotrexate. The effect of ketorolac tromethamine on methotrexate clearance has not been studied.

There is limited experience on concurrent administration with morphine. Available information shows no evidence of adverse interactions. The extent of a possible narcotic-sparing effect of ketorolac tromethamine is currently under investigation.

## Adverse Effects

**Toradol tablets:** The incidence of adverse reactions in approximately 600 patients and subjects receiving short-term oral therapy (less than 2 weeks) with Toradol (ketorolac tromethamine) are listed below. The most common adverse effects include: Gastrointestinal: dyspepsia (2%), gastrointestinal pain (2%), nausea (2%). Central nervous system: headache (2%), dizziness (2%).

The following adverse events are rare but have been reported (less than 1%): Gastrointestinal: flatulence, gastritis. Respiratory: dyspnea. Dermatologic: urticaria, rash, pruritus. Metabolism/nutritional: edema. Body as a whole: asthenia. Hemic and lymphatic: purpura. Musculoskeletal: myalgia.

**Toradol IM:** The adverse reactions listed below were reported to be probably related to Toradol IM in clinical trials in which patients received up to 20 doses of 30 mg of intramuscularly administered Toradol over a period of up to five days.

Incidence between 3 and 9%: Gastrointestinal: nausea, dyspepsia, gastrointestinal pain. Central nervous system: drowsiness.

Incidence between 1 and 3%: Gastrointestinal: diarrhea. Central nervous system: dizziness, headache, sweating. Body as a whole: edema. Injection site pain was reported by 2% of patients in multi-dose studies (vs. 5% for morphine control group).

Incidence 1% or less: Gastrointestinal: constipation, flatulence, gastrointestinal fullness, liver function abnormalities, melena, peptic ulcer, rectal bleeding, stomatitis, vomiting. Body as a whole: asthenia, myalgia. Cardiovascular: vasodilatation, pallor. Hemic and lymphatic: purpura. Nervous system: dry mouth, nervousness, paresthesia, abnormal thinking, depression, euphoria, excessive thirst, inability to concentrate, insomnia, stimulation, vertigo. Respiratory: dyspnea, asthma. Urogenital: increased urinary frequency, oliguria. Dermatologic: pruritus, urticaria. Special senses: abnormal taste, abnormal vision.

## Overdosage

The absence of experience with acute overdosage precludes characterization of sequelae and assessment of antidotal efficacy at this time. In a gastroscopic study of healthy subjects, daily doses of 360 mg given over an 8-hour interval for each of five consecutive days (3 times the highest recommended dose) caused abdominal pain and peptic ulcers which recovered after discontinuation of dosing.

## Dosage and Administration

**Adults:** Dosage should be adjusted according to the severity of the pain and the response of the patient.

**Oral:** The usual oral dose of Toradol (ketorolac tromethamine) is 10 mg every 4 to 6 hours for pain as required. Doses exceeding 40 mg per day are not recommended.

Toradol is recommended for short-term use only i.e. for a maximum of a few weeks.

**Parenteral:** The recommended usual initial dose is 30 mg. Subsequent dosing may be 10 mg to 30 mg every 4-6 hours as needed to control pain. A lower initial dose may be suitable for patients under 50 kg in body weight, over age 65 years and/or with less severe pain at baseline. In the initial post-operative period, more frequent dosing (e.g., every 2 hours) may be employed, but the total daily dose should not exceed 120 mg. Dose above 120 mg could cause drug toxicity (see Warnings & Precautions). If supplemental analgesia is required, a concomitant low dose of opiate can be used.

The administration of continuous multiple daily doses of Toradol IM should not exceed 5 days for injection dosing. There has been limited experience with dosing for more than 5 days since the vast majority of patients have transferred to oral medication or no longer required analgesic therapy after this time.

**Directions for use:** Insert the plunger into the syringe barrel and thread it onto the screw. WITHOUT REMOVING THE NEEDLE GUARD, apply quick, firm pressure to the plunger to break the inner seal (you will feel it let go). Pull back on the plunger slightly to relieve pressure. Remove the needle guard by twisting as you pull. Use the unit as you would a normal syringe. Dispose of properly.

## Conversion From Parenteral To Oral Therapy

Toradol tablets may be used either as monotherapy or as follow-on therapy to parenteral ketorolac. In the latter case, the total combined daily dose of ketorolac should not exceed 120 mg on the day the change of formulation is made, this includes a maximum of 4 of the 10 mg tablets.

Toradol (ketorolac tromethamine) is a Schedule F drug.

## Composition

**Toradol Tablets:** Each Toradol tablet contains ketorolac tromethamine, the active ingredient, with microcrystalline cellulose, lactose and magnesium stearate. The coating suspension contains hydroxy-propyl-methylcellulose, titanium dioxide and polyethylene glycol.

**Toradol IM:** Toradol IM is available for intramuscular administration as: 15 mg in 1 mL (1.5%), or 30 mg in 1 mL (3%) of ketorolac tromethamine in sterile solution. The 15 mg/mL solution contains 10% (w/v) alcohol, USP, and 6.68 mg sodium chloride in sterile water. The 30 mg/mL solution contains 10% (w/v) alcohol, USP and 4.35 mg sodium chloride in sterile water. The pH is adjusted with sodium hydroxide or hydrochloric acid. The sterile solutions are clear and slightly yellow in colour.

## Stability and Storage Recommendations

**Toradol Tablets:** Store at room temperature. The blister package tablets should be protected from light.

**Toradol IM:** Store at room temperature with protection from light.

## Availability of Dosage Forms

Toradol (ketorolac tromethamine) is available as 10 mg white round film coated tablets with one side printed in red with TORADOL inside a bold T and the other side with Syntex. Toradol (ketorolac tromethamine) 10 mg tablets are available in bottles of 100 and 500 tablets.

Toradol IM is available in 1 mL syringes containing 15 or 30 mg/mL of ketorolac tromethamine.

Product Monograph available on request.

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**BRITISH COLUMBIA:** Dentist with 15 years experience seeking associateship in the Fraser Valley, Okanagan or Kootenay areas of B.C. Family wishes to relocate. Wife is a hygienist available to work part time in the practice too. Please reply to CDA ACCESS Box 2545. (06/06)

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Further information and application forms may be obtained from:



The Secretary, Division of Periodontics  
Department of Clinical Dental Sciences  
Faculty of Dentistry  
The University of British Columbia  
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**Dasman 15456**  
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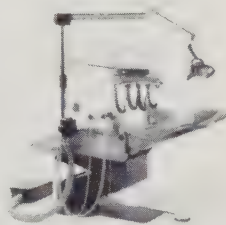
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Contact Dr. Paul Lambert, 14965 Stony Plain Rd.,  
Edmonton, Alberta T5P 4W1 (403) 484-3931 (O),  
(403) 481-4736 (R) (03/06)

#### THE CANADIAN ASSOCIATION OF DENTAL CONSULTANTS

is holding a Fall Workshop in Kitchener,  
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more information contact: Dr. R.G.  
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Kitchener, Ont. N2J 1N8. Phone (519)  
744-5562, Fax (519) 746-7829. (60/09)

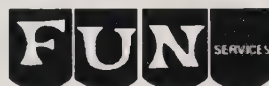
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